

Entry Test Preparation & Practice Book

A solution to

MDCAT PHYSICS



Features

- Easy and Concise material
- ➤ Short Tricks to solve MCQs
- Urdu Explanation is added for easy understanding
- Key and explanation of MCQs are included

Written by

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NMDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

Assingur Basur, Faisalaba L.

PREFACE

I, PROF. AZHAR IQBAL, am teaching Physics to the students of MDCAT and F.Sc from the last 12 years. Since long, I have been observing the problems of Students of MDCAT, as well as feeling that for the preparation of MDCAT, there are no such books in the market that can solve the problems of the students. Therefore, in order to solve the problems of the students of MDCAT, I decided to write comprehensive book.

Now, by the grace of Allah, The Almighty, I have successfully written a book for the student of MDCAT. The book contains two portions i.e, MDCAT preparation book and MDCAT practice book. This book is a combination multiple extraordinary qualities that have never been observed in any other book.

- > All the topics have been written in quite an easy way.
- > The book has been written according to prescribed syllabus of MDCAT
- Difficult questions have solved by using short tricks
- > A chapter consisting of short tricks have also been added in the book
- Difficult concepts have also been described in Urdu for the convenience and better comprehension of the students.

I hope this book will be quite helpful in solving the problems of the students of MDCAT. It will lead them to the target learning as well.

I am looking forward for your valuable suggestions and feedback. So that I will make improvements in this effort in my next edition.

Best wishes

Author Prof. AZHAR IQBAL WhatsApp: 0336 709 8894

MIDCAT PREP BOOK

DEDICATION

To

My Beloved Wife,

For her continued unfailing Love, Support and Understanding that made the completion of this book possible.

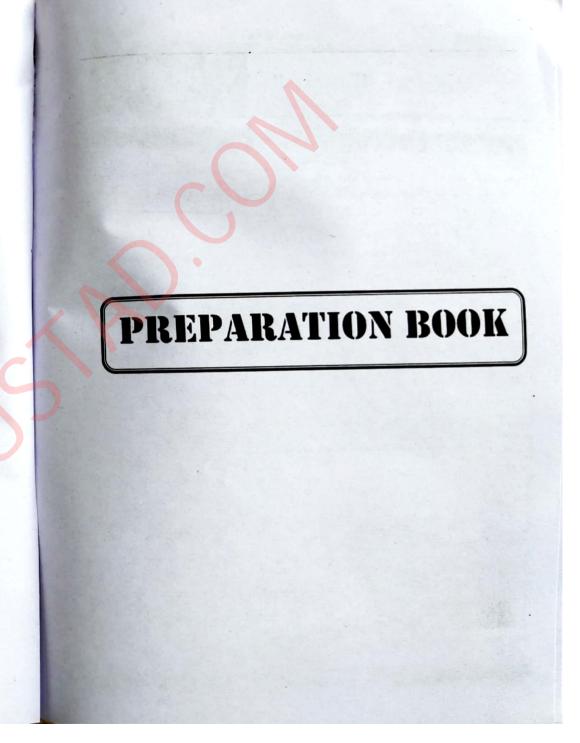
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P BOOK

UNIT $00 \rangle$

BASIC TRICKS

Important Tips to Solve Physics MCQ's

1. فز کرکے زیادور MCQ's کا تعلق Formulas کے ساتھ ہو تا ہے اس لئے جب بھی آپ کوئی Topic پڑھیں تواس میں استعال ہونے والے Formulas کو اچھی طرح یاد کریں اور Formulas سے بنے والے مندر جہ ذیل قشم کے سوالات کو ضرور مد نظر رکھیں۔

1. ایک Quantity کی دو بر Quantity کی دو ایک Quantity کی اا جو گا۔

Example:

By increasing the distance from the positive point charge its potential:

- (a) Increases
- (b) Decreases ✓
- (c) remain same
- (d) either increases or decreases

As $V = \frac{\kappa q}{r}$ or $V \propto \frac{1}{r}$

By increasing distance V decreases.

Example:

Two bodies having equal mass are moving with velocities 10 ms⁻¹ and 20 ms⁻¹ then the ratio between their K.E is

- (a) 1:2
- (b) 2:1
- (c) 1:4V
- (d) 4:1

Solution:

As $K.E = \frac{1}{2}mv^2$ or $K.E \propto v^2$ The ratio between velocity is 1:2 so ratio in K.E is 1:4

3. اگر کی ایک Quantity کو Half Double وغیره کردیاجائے تودو سر کی Quantity یر کیا اڑ ہوگا۔

Example:

If length of pendulum is doubled then its time period will become

- (a) Double
- (b) Half
- (c) $\sqrt{2}$ times \checkmark (d) $\frac{1}{\sqrt{2}}$ times

Solution: As $T = 2\pi \int_{a}^{\ell}$ or

 $T \propto \sqrt{\ell}$ If length is doubled T becomes $\sqrt{2}$ times.

(Two-Two Values Relationship)

4. اگرایک Quantity کی دوولیوز اور دو سر Quantity کی ایک value دی گئی ہو تو اس کی دو سر ی ولیو کیا ہوگی۔

Example:

If at pressure 10 atm the volume of the gas is $2m^3$. At what $\frac{p_2}{p_1} = \frac{v_1}{v_2} \Rightarrow P_2 = \frac{p_1 v_1}{v_2} = \frac{10 \times 2}{5}$ pressure the volume of the gas will be 5m3.

- (a) 5 atm
- (b) 4 atm
- (c) 3 atm
- (d) 2 atm

- independent dependent Quantities 3 Quantity 1 5 Solution:

Example:

Speed of sound in air is independent of:

(a) density of air

(b) pressure of air√

As $v = \sqrt{\frac{\gamma P}{\rho}}$ and $\rho \propto P$

(c) Temperature of air

(d) None of these

(Numerical Type Question)

6. Numerical Type Question کو Solve کرنے کے لیے Quantities کر کوئی اور کی ے بارے میں یو چھا گیا ہے اور ان کا آئی می Relation کیا ہے۔

Example: If a body of a mass 2kg is moving with momentum 6Ns then its K.E will be:

(a) 6 J

(b) 9 J

(c) 12 J (d) 15 J

Solution: As $K.E = \frac{p^2}{2m} = \frac{6^2}{2 \times 2}$ $= \frac{36}{4} = 9J$

$$=\frac{36}{4}=9J$$

(Re-arranging Formulas)

7. کی بھی فار مولے کو Re-arrange کے یا Variables ہدل کریج تھا جاسکا ہے۔

Example:

If T is time period of simple pendulum at a place where acceleration due to gravity is g then length of pendulum is:

(b) $\frac{gT}{4\pi^2}$ (c) $\frac{4\pi^2}{aT^2}$ (d) $\frac{4\pi}{aT^2}$

Solution:

$$As T = 2\pi \sqrt{\frac{\rho}{g}}$$

$$\ell = \frac{gT^2}{4\pi^2}$$

(Graphical Types Question)

Quantities .8 كات كياموكا كراف كي الموكار الدك في Area كيابتا كال

Example 1: The graph between potential energy stored in a capacitor verses voltage across the capacitor is:









Example 2: The slope of velocity time graph represent the: (a) displacement (b) acceleration (c) momentum (d) force Example 3: Area under force displacement graph represent the:

- (a) acceleration of the body (b) Work done on the body
- (c) Power of the body
- (d) Impulse on the body

Solution 1:

As $P.E = \frac{1}{2}CV^2$

 $P.E \propto V^2$

So the graph between P.E and Voltage is a parabola.

Solution 2:

Slope = v/t = a

Solution 3:

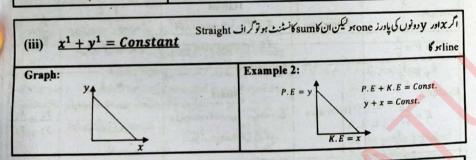
area = Fd = W

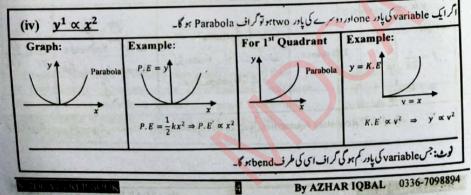
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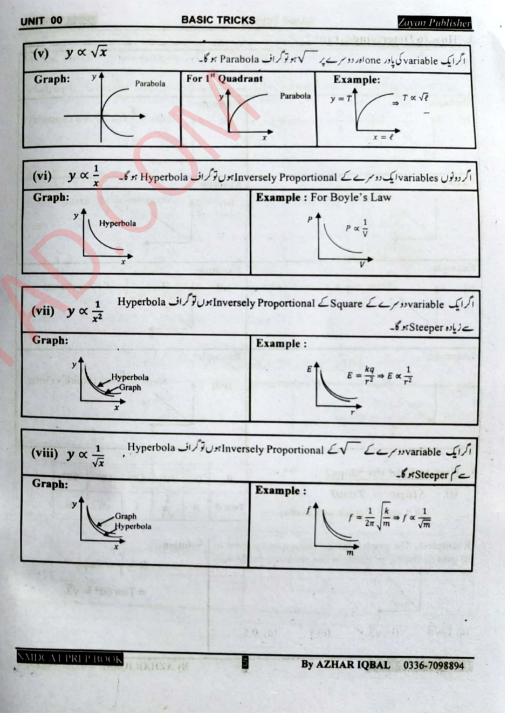
UNIT 00 2 Important Relations Between Quantities

Relation	If value of x increases then y	If value of x doubled then y	If values of x are in ratio 2:3 then ratio in y is	Two-Two values relation
$y \propto x$ Example: Q = CV $\Rightarrow Q \propto V$	Increases	Doubled چنا x مین آ در کار ۲ مجی در change در ناست	2 : 3 جو x شرع rratio گونتی و مثل مجمی ہوگی	$\frac{y_2}{y_1} = \frac{x_2}{x_1}$
$y \propto x^2$ Example: $K.E = \frac{1}{2}mv^2$ $\Rightarrow K.E \propto v^2$	Increases	Four times مرابع نے Square Evalues و مربع المام علم اللہ اللہ اللہ اللہ اللہ اللہ اللہ ال	اری square values کر کے square values کے catio	$\frac{y_2}{y_1} = \frac{x_2}{x_1}$
$y \propto \sqrt{x}$ Example: $T = 2\pi \sqrt{\frac{\ell}{g}}$ $\Rightarrow T \propto \sqrt{\ell}$	Increases	√2 times ربر کی خاص خوالاد پرکو خوالاد کا کی کی کار خوالاد کار	$ \sqrt{2}: \sqrt{3} $ $ \angle \int \sqrt{y} \text{ values } \int \sqrt{y} x $ $ \int \angle \text{ ratio } \sqrt{x} y = 0 $	$\frac{y_2}{y_1} = \frac{\sqrt{x}}{\sqrt{x}}$
$\Rightarrow T \propto \sqrt{\ell}$ $y \propto \frac{1}{x}$ Example: $PV = Const.$ $\Rightarrow P \propto \frac{1}{V}$	Decreases	Halved が Y - も こ T change かなな - も こ T change け time さい	3:2 אינאט ratio אינאט אינ אינאט אינאט אינ	$\frac{y_2}{y_1} = \frac{x_1}{x_2}$
$y \propto \frac{1}{x^2}$ Example: $E = \frac{kq}{r^2}$ $\Rightarrow E \propto \frac{1}{r^2}$ $y \propto \frac{1}{\sqrt{x}}$	Decreases	1 times 1 times 2 جائل کے square values فر x 1 کی کے کو لادhange کریا	9:4 Square Evalues في x التاكر في عرب التاكر في ك	$\frac{y_2}{y_1} = \frac{x_1^2}{x_2^2}$
$y \propto \frac{1}{\sqrt{x}}$ Example: $f = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$ $\Rightarrow f \propto \frac{1}{\sqrt{m}}$	Decreases	1 times シグローグ√ Kvalues v x - ピー・テ な change v y ←	√3:√2 ニシン Evalues & x ≟ratio Cy = ニンピリ	$\frac{y_2}{y_1} = \frac{\sqrt{x_1}}{\sqrt{x_2}}$

قوب کوئی بھی و quantities میں quantities و اور اللہ علی اللہ antities کا کے سے اللہ antities کا کے سے اللہ antities



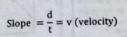




4. Slope of the Graph:

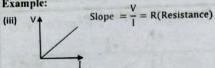
Slope = $\frac{y}{x}$

Example: d4



Example:	
(ii) F	Slope = $\frac{1}{x}$ = k (Spring Constant)
	_

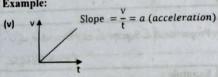
Example:



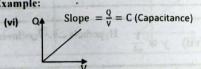
Example:

Slope = $\frac{Q}{t}$ = 1 (Current)

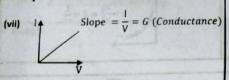
Example:



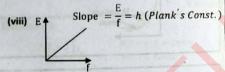
Example:



Example:



Example:



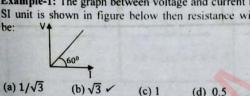
5. How to Find the Slope?

(i).
$$Slope = Tan\theta$$

(θ is angle of graph with x-axis)

θ	00	30°	45°	60°	90°
Tan θ	0	$\frac{1}{\sqrt{3}}$	1	√3	00

Example-1: The graph between voltage and current in | Solution: SI unit is shown in figure below then resistance will be:



$$R = \frac{V}{I} = slope$$
$$= Tan 60^{\circ} = V$$

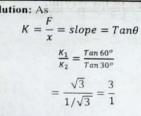
$$= Tan 60^{\circ} = \sqrt{3}$$

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Example-2: The graph between force and extension | Solution: As for two spring is shown in figure below then find the ratio between the spring constant.



(c) 1:1 (b) 3:1 ✓



(ii). Slope = $\frac{\Delta y}{\Delta x}$

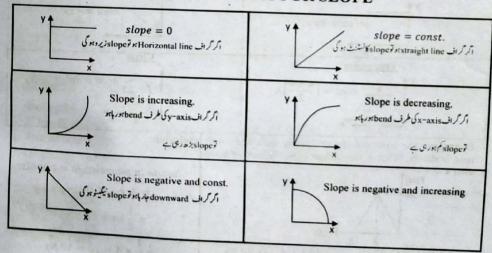
(a) 1:3

Example: The graph between charge and voltage for | Solution: capacitor is shown in figure below. The capacitance of capacitor will be:



(a) 5µF ✓ (b) 2.5µF (c) 15µF (d) $10\mu F$ $= 5\mu F$

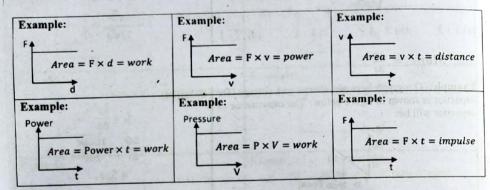
DIFFERENT CASES FOR SLOPE



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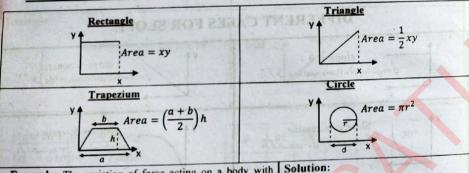
6. Area Under the Graph:

گرانے Areak کی represent کتاہے پید لگانے کیلئے x-axis اور auantities کی میں کہ کوئی quantity فارمولا بنا ہے۔

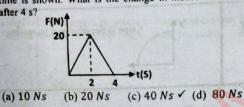


Note: Greater the area under the graph, larger the quantity.

7. How to find the area under the graph.



Example: The variation of force acting on a body with time is shown. What is the change in momentum of body after 4 s?



Change in momentum = impulse
$$= Area \text{ of triangle}$$

$$= \frac{1}{2} base \times height$$

$$= \frac{1}{2} \times 4 \times 20 = 40 \text{ Ns}$$

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8. Percentage Type Ouestions:

UNIT 00

If percentage change in X is less than 10% then percentage change in Y is given as: % change in Y = Power of X (% change in X)

(a) 6% (b)
$$\sqrt{6}$$
% (c) 3% \checkmark (d) 1.5%

Example:

If length of pendulum is increased by 6% then its time period will be increased by:

(a) 6% (b)
$$\sqrt{6}$$
% (c) 3% \checkmark (d) 1.5%

Solution: As $T = 2\pi \sqrt{\frac{\ell}{g}} \Rightarrow T \propto \sqrt{\ell}$ %change in $T = \frac{1}{2}$ (%change in ℓ) = 3%

2nd Type Suppose X and Y are related as $Y \propto X^2$

If percentage change in X is greater than 10% then percentage change in Y is given as: (i). When X increases:

% change in Y = 2(% change in X) +
$$\left(\frac{\text{% change in } X}{10}\right)^2$$

Example:

If momentum of a body increases by 20% then its K.E will be increased by:

(a) 20% (b) 40% (c) 44%
$$\checkmark$$
 (d) 400%

(ii). When X decreases:

Solution: As $K.E = \frac{P^2}{2m} \Rightarrow K.E \propto P^2$ % change in K.E= $2(20\%) + \left(\frac{20\%}{10}\right)^2 = 44\%$

% change in Y = 2(% change in X) -
$$\left(\frac{\text{% change in } X}{10}\right)^2$$

Example:

Example: If momentum of a body decreases by 10% then its K.E will be decreased by:

(a) 9% (b) 5% (c) 10% (d) 19%

Solution: As
$$K.E = \frac{\rho^2}{2m} \Rightarrow K.E \propto \rho^2$$
 % change in K.E= $2(10\%) - \left(\frac{10\%}{10}\right)^2$ = 44%

3rd Type: If change in X is multiple of 100%.

Example:

If length of the pendulum is increased by 100% Solution: As $T = 2\pi \sqrt{\frac{\ell}{g}} \Rightarrow T \propto \sqrt{\ell}$ then its time period will become:

(a) Double (b) Half (c)
$$\frac{1}{\sqrt{2}}$$
 times (d) $\sqrt{2}$ times

Solution: As
$$T = 2\pi \sqrt{\frac{\ell}{g}} \Rightarrow T \propto \sqrt{\ell}$$

If length increases by 100% its mean it is doubled. Then time period will become $\sqrt{2}$ times

" Change	100 %	200.04		The health
Quantity		200 %	300 %	400 %
Decomes	Doubled	Three times	Four times	Five times

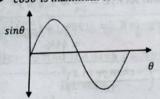
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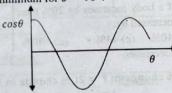
9. Trigonometric Ratios.

θ	0°	30°	45°	60°	90°
sinθ	0	$\frac{1}{2} = 0.5 = 50\%$	$\frac{1}{\sqrt{2}} = 0.7 = 70\%$	$\frac{\sqrt{3}}{2} = 0.86$ $= 86\%$	1 100%
cosθ	1% 100%	$\frac{\sqrt{3}}{2} = 0.86 = 86\%$	$\frac{1}{\sqrt{2}} = 0.7 = 70\%$	$\frac{1}{2} = 0.5$ = 50%	0 0%

Notice from the above table:

- \triangleright Value of $sin\theta$ increases by increasing angle and vice versa.
- \triangleright Value of $cos\theta$ decreases by increasing angle and vice versa.
- > $sin\theta$ is maximum for $\theta = 90^{\circ}$ and minimum for $\theta = 0^{\circ}$.
- \triangleright cos θ is maximum for $\theta = 0^{\circ}$ and minimum for $\theta = 90^{\circ}$.





PREFIXES

Prefix	Decimal	Multiplier	Prefix	Decimal	Multiplier
. //	10 ²⁴	Y	Deci	10-1	d
Yotta	10 ²¹	Z	Centi	10-2	c
Zetta	10 ¹⁸	E	Milli	10-3	m
Exa	10 ¹⁵	p	Micro	10-6	μ
Peta	1012	T	Nano	10-9	n
Tera	109	G	Pico	10-12	p
Giga	106	M	Femto	10-15	f
Mega	103	k	Atto	10-18	a
Kilo	10 ²	h	Zepto	10-21	Z
Hecto	10 ¹	da	Yocto	10-24	у

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SI BASE QUANTITIES AND BASE UNITS

BASIC TRICKS

Base qua	ntity	SI Bas	e Unit
Name	Symbol	Name	Symbol
Length	L	Meter	m
Mass	m	Kilogram	kg
Time, duration	t	Second	S
Electric current	1 = 1 = 1	Ampere	A
Thermodynamic temperature	T	Kelvin	K
Amount of substance	n-a-	Mole	mol
Luminous intensity	I _v	Candela	cd

SOME IMPORTANT CGS UNIT
AND THEIR RELATION WITH SI UNIT

Quantity	cgs units	
Length		Equivalent in SI units
Ashi-ware	cm(centimeter)	10 ⁻² m
Mass	g (gram)	$10^{-2}kg$
Time	s (second)	Topics - making and appropriate
Force	1 1 2 2 2	S
Energy	dyn (dyne)	10 ⁻⁵ N
The second secon	erg	10-7/
Charge	(Franklin) Fr	
Current	Bi (biot)	$3.34 \times 10^{-10}C$
Heat energy		10A
Magnetic flux density	Cal (calorie)	4.18/
	G (gauss)	Parallel Parallel
Magnetic flux	Mx (Maxwell)	10 ⁻⁴ T
CAT PRLP BOOK	(Simawell)	10 ⁻⁸ Wb

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UNIT 00

BASIC TRICKS

Physics Quantities Having No units

Following physical quantities have no units Strain, dielectric constant, refractive index, specific gravity, magnification, relative permeability etc.

Note

Physical quantities which are to be added or subtracted must have same units.

Physical Quantities Having Same Units				
Quantities	Units	Dimensions		
Energy, Work and Heat	$Joule = 1J = kgm^2 s^{-2}$	ML ² T ⁻²		
Impulse and Momentum	$Ns = kgms^{-1}$	MLT ⁻¹		
Electric Field intensity and Potential gradient	$\frac{N}{C} = kgms^{-3}A^{-1}$	MLT ⁻³ A ⁻¹		
Plank's constant and Angular momentum	$Js = kgms^2s^{-1}$	ML ² T ⁻¹		
Pressure, Stress, Modulus of elasticity and Energy density	$\frac{N}{m^2} = kgm^{-1}s^{-2}$	ML ⁻¹ T ⁻²		
General gas constant and Molar specific heat	$Jmol^{-1}K^{-1} = kgm^2s^{-2}.mol^{-1}k^{-1}$	$ML^2T^{-2}N^{-1}\theta^{-1}$		
Surface tension and spring constant	$\frac{N}{m} = kgs^{-2}$	MT ⁻²		
Entropy, Heat capacity and Boltzman constant	$\frac{J}{K} = kgm^2 s^{-2} k^{-1}$	$ML^2T^{-2}\theta^{-1}$		
Resistance, Reactance of capacitor, reactance of inductor and impedence	$\frac{V}{A} = Jc^{-1}A^{-1} = kgm^2s^{-3}A^{-2}$	ML ² T ⁻³ A ⁻²		

SOME IMPORTANT DERIVED QUANTITIES AND THEIR UNITS.

OLD NETETY	SI UNIT	IN-TERMS OF BASE UNITS
QUANTITY		ms ⁻¹
Velocity	ms ⁻¹	
Acceleration	ms ⁻²	ms ⁻²
Acceleration	m ²	m ²
Area	The State of	m ³
Volume	m^3	The state of the s
	kgm ⁻³	kgm ⁻³
Density	N ASSESSED N	kgms ⁻²
Force	N	By AZHAR IQBAL 0336-70988

QUANTITY	SI UNIT	IN-TERMS OF BASE UNITS
Work, Energy	J	kgm^2s^{-2}
Power	W	$Js^{-1} = kgm^2s^{-3}$
Pressure, Stress	Pa	$Nm^{-2} = kgm^{-1}s^{-2}$
Torque	Nm	kgm ² s ⁻²
Modulus of elasticity	Nm ⁻²	kgm ⁻¹ s ⁻²
Angular momentum	J.s	kgm^2s^{-1}
Impulse, Momentum	N.s	kgms ^{−1}
Surface tension	Nm ⁻¹	kgs ⁻²
Boltzman constant	Jk^{-1}	$kgm^2s^{-2}K^{-1}$
Gravitational constant	Nm^2kg^{-2}	$kg^{-1}m^3s^{-2}$
Charge	С	A.s
Electric potential	$V = JC^{-1}$	$kgm^2s^{-3}A^{-1}$
Resistance	$ohm = VA^{-1}$	$kgm^2s^{-3}A^{-2}$
Capacitance	$F = CV^{-1}$	$kg^{-1}m^{-2}s^4A^2$
Inductance	$VsA^{-1} = H$	$kgm^2s^{-2}A^{-2}$
Electric flux	Nm ² C ⁻¹	$kgm^3s^{-3}A^{-1}$
Magnetic flux	$Wb = NmA^{-1} = T.m^2$	$kgm^2s^{-2}A^{-1}$
Magnetic induction	$T = Wbm^{-2} = Nm^{-1}A^{-1}$	
Permittivity	$C^2N^{-1}m^{-2}$	kgs ⁻² A ⁻¹
Permeability	Wbm ⁻¹ A ⁻¹	$kg^{-1}m^{-3}s^4A^2$
Entropy	/K ⁻¹	kgms ⁻² A ⁻²
General gas constant	Jmol ⁻¹ K ⁻¹	$kgm^2s^{-2}K^{-1}$
Electric field intensity	NC-1	$kgm^2s^{-2}mol^{-1}K^{-1}$
Plank's constant		$kgms^{-3}A^{-1}$
	J.s	kgm ² s ⁻¹

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SOME IMPORTANT PHYSICAL QUANTITIES

Quantities S	Symbol	Value
Time period of geostationary satellite	T	24 hour
Minimum height of geostationary satellite	h	36000 km
Radius of geostationary satellite	γ	42400 km
Speed of sound (0° C)	v	332 ms ⁻¹
Avogadro's number	No	6.02×10^{23} particles
Boltzman constant	K	$1.38 \times 10^{-23} Jk^{-1}$
General gas constant	R	$8.314 Jkg^{-1} mol^{-1}$
Specific heat of water	С	$4186 Jkg^{-1}k^{-1}$
Permittivity of free space	ϵ_o	$8.85 \times 10^{-12} C^2 N^{-1} m^{-2}$
Charge on electron	-е	$-1.6 \times 10^{-19} C$
	+e	$+1.6 \times 10^{-19} C$
Charge of proton	+2e	$3.2 \times 10^{-19} C$
Charge on alpha particle	K	$9 \times 10^9 Nm^2 C^{-2}$
Columb constant for free space	μο	$4\pi \times 10^{-7} Wbm^{-1}A^{-1}$
Permeability of free space	V	0.7V
Potential barrier for Si	V	0.3V
Potential barrier for Ge	C	$3 \times 10^8 \ ms^{-1}$
Speed of light in free space	m _o	Zero
Rest mass of photon		Zero
Charge of photon	q h	$6.63 \times 10^{-34} Js$
Plank constant	2000	$2.43 \times 10^{-12} \ m^{-1}$
Compton's wavelength	λ_c	0.053 nm
Radius of 1st orbit of hydrogen atom	r_1	$2.19 \times 10^6 \text{ ms}^{-1}$
Velocity of electron in 1 st orbit of hydrogen	V ₁	-13.6 eV
Ground state energy of hydrogen	Eo	1.05×10^{-34} Js
Angular momentum of first orbit of hydrogen	L ₁	$1.6606 \times 10^{-27} kg$
Unified atomic mass unit	1u	1.6606 × 10 × 10
Mass of electron	m _e	$9.1 \times 10^{-31} \ kg = 0.000554$
Mass of proton	m_p	$1.673 \times 10^{-27} kg = 1.007274$
Mass of neutron	m_n	$1.675 \times 10^{-27} \ kg = 1.0086650$
e/m of electron	Thors!	$1.75 \times 10^{11} \ Ckg^{-1}$
	-	$9.6 \times 10^7 \ Ckg^{-1}$
e/m of proton		Zero
e/m of neutron m/e of neutron		Infinite

By AZHAR IQBAL 0336-7098894

UNIT $01 \rangle$

FORCE AND MOTION

Mechanics:

Study of motion of objects is called mechanics. It is divided into two types.

- (i) Kinematics (ii) Dynamics
 - i. Kinematics: Study of motion of objects without referring the force.
 - ii. Dynamics: Study of motion of objects taking into consideration of force (the cause of motion)

FORCE AND MOTION

Distance:

Total length of path followed by body is called distance.

- > It is scalar quantity. its SI unit is meter.
- > It may be zero or positive but never negative.
- Distance of a body in motion can never be zero. Example: (i) For one vibration distance = 4A (ii) For one revolution distance = $2\pi r$

Example: Consider an object moves in a closed path 4m Total distance =3+4+5=12m

Displacement:

Change in position of a body from its initial position to find position is called displacement.

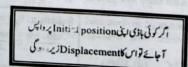
- > It is vector quantity and its direction is from initial to final position.
- > Its SI unit is meter

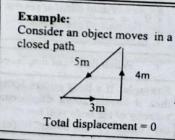
$$\vec{d} = \vec{r}_f - \vec{r}_i.$$

(Displacement = Final position vector - Initial position vector)

- It may be positive, negative or zero.
- It is shortest distance between initial and final position.
- Displacement is always less than or equal to distance.
- If a body moves in straight line its displacement
- and distance are equal.

Example: (i) For one vibration, displacement = 0(ii)For one revolution, displacement = 0





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UNIT 01

Example: Find magnitude of displacement, if a body moves from $\vec{d} = \vec{r}_f - \vec{r}_i = (5\hat{\imath} + 7\hat{\jmath}) - (2\hat{\imath} + 3\hat{\jmath})$ point P(2, 3) to a point Q(5,7).

(a) 4m

(b) 5m (c) 7m (d) 17m

Solution:

$$\vec{d} = \vec{r}_{f} - \vec{r}_{i} = (5\hat{\imath} + 7\hat{\jmath}) - (2\hat{\imath} + 3\hat{\jmath})$$

$$= 3\hat{\imath} + 4\hat{\jmath}$$

$$|\vec{d}| = \sqrt{(3)^{2} + (4)^{2}} = 5m$$

Speed:

Distance covered by a body in one second is called speed.

- > It is scalar quantity and its SI unit is ms-1
- > It is always positive.
- > Speed of a moving object cannot be zero or negative.
- > The ratio of speed to magnitude of velocity of an object is always greater than one. total distance

Motion	Speed
Speed of electro magnetic waves	$3 \times 10^8 ms^{-1}$
Speed of Earth around the sun	$2.96 \times 10^4 \ ms^{-1}$
Speed of moon around the earth	$1\times10^3~ms^{-1}$
Speed of sound in air $(0^{\circ}C)$	332 ms ⁻¹
Speed of running cheetah	29 ms ⁻¹

Example:

Consider an object moves in a closed path of radius 2m with time period 3.14 sec. then its speed is

(a) 2ms⁻¹

(b) 4ms⁻¹ (c) 4πms⁻¹

(d) zero

Solution: .

Speed =
$$\frac{Total\ distance}{Time}$$
 = $\frac{2\pi r}{T}$ = $\frac{2\times 3.14\times 2}{3.14}$ = 4ms^{-1}

Velocity:

Rate of change of displacement of the body is called velocity.

- > It is vector quantity. Its SI unit is ms⁻¹.
- > It may be positive, negative and zero.
- > |v|is always less than or equal to speed.
- > For straight line motion in one direction $|\vec{v}| = speed$

$$\vec{v}_{av} = \frac{Total\ displacement}{Total\ time}$$

Example:

Consider an object move from one end to other end of diameter of a circle of radius 1m in 5sec



$$\vec{v}_{av} = \frac{Total \ displacement}{Total \ time}$$

$$=\frac{2r}{t}=\frac{2\times 1}{5}=0.4 \text{ ms}^{-1}$$

 d_1+d_2 When different displacements and time are given: Vav

Example: If a body covers 100m displacement in 4sec and Solution: $v_{av} = \frac{d_1 + d_2}{t_1 + t_2}$ then it covers 200m displacement in 6sec. The average velocity of the body will be:

(b) $20ms^{-1}$ (c) $30ms^{-1}$ (d) $40ms^{-1}$

 $\frac{100 + 200}{4 + 6} = \frac{300}{10} = 30 ms^{-1}$

(a) $10ms^{-1}$

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When different velocities and time are given: $v_{av} = \frac{v_1 t_1 + v_2 t}{t_1 + t_2} (put \ d = v \ t)$

Example: If a body is moving with velocity 60ms-1 for 1st hour and 30ms-1 for next two hours. Then its average velocity of the body will be:

(a) $30kmh^{-1}\checkmark$ (b) $60kmh^{-1}$ (c) $90kmh^{-1}$ (d) $120kmh^{-1}$

Solution: $v_{av} = \frac{v_1 t_1 + v_2 t}{t_1 + t_2}$ $=\frac{(60)(1)+(30)(2)}{}$ $=30kmh^{-1}$

iii. If velocities are given and time internals are equal $(t_1 = t_2)$: $v_{av} = \frac{v_1 + v_2}{2}$

Example: If a car is moving a velocity 20 ms⁻¹ for 1st half | Solution: $v_{av} = \frac{v_1 + v_2}{2}$ hour and with velocity 30ms⁻¹ for next half hour. Then its average velocity of the body will be:

(a) $12.5ms^{-1}$ (b) $25ms^{-1}$ (c) $50ms^{-1}$ (d) $60ms^{-1}$

 $=\frac{20+30}{3}=\frac{50}{3}=25ms^{-1}$

iv. When different velocities and displacements are given: $v_{av} = \frac{(d_1+d_2)v_1v_2}{d_1v_2+d_2v_1}$ $(t=\frac{d}{v})$

Example: If a velocity of a body is $2ms^{-1}$ for 100m Solution: $v_{av} = \frac{(d_1+d_2)v_1v_2}{d_1v_2+d_2v_1}$ displacement and 4ms-1 for next 400m displacement. Then average velocity of the body will be:

(a) $3ms^{-1}$ (b) $3.3ms^{-1}$ (c) $6ms^{-1}$ (d) $6.3ms^{-1}$

= (100+400)×2×4 _ 4000 $(100\times4)+(400\times2) = 1200$ $= 3.3 ms^{-1}$

v. If displacement are equal $(d_1 = d_2)$.

Example: If body covers first half displacement with velocity 10ms-1 and next half displacement with velocity 20ms⁻¹. Then its average velocity of the body will be:

(a) $13.3ms^{-1}$ (b) $15ms^{-1}$ (c) $20.5ms^{-1}$ (d) $0ms^{-1}$

Solution: $v_{av} = \frac{2v_1v_2}{v_1v_2}$ $\frac{2\times10\times20}{10+20} = \frac{400}{30}$ $= 13.3 \text{ms}^{-1}$

Uniform Velocity:

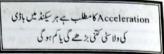
If body covers equal displacements in equal intervals of time then it is moving with uniform velocity.

If body is moving with uniform velocity then instantaneous and average velocity are equal.

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Instantaneous Velocity:

Velocity of body at any particular instant of time is called instantaneous velocity. OR limiting value of $\frac{\Delta \vec{d}}{\Delta t}$ as time interval Δt approaches to zero.



$$\vec{V}_{ins} = \lim_{\Delta t \to 0} \frac{\Delta \vec{d}}{\Delta t}$$

Acceleration:

Rate of change of velocity of a body is called acceleration.

Average Acceleration:

$$\vec{a}_{av} = \frac{\overrightarrow{\Delta v}}{\Delta t} = \frac{\vec{v}_{\rm f} - \vec{v}_{\rm i}}{t}$$

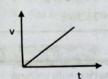
- ➤ It is vector quantity and its SI unit ms⁻²
- > Its direction is always along the direction of force.
- It may or may not be in the direction of velocity.
- Acceleration is positive and parallel to velocity when velocity of body increases.
- Accelerations is negative and anti-parallel to velocity when velocity of body decreases.
- > Acceleration is zero when velocity of the body is constant.
- Acceleration is perpendicular to velocity when speed of the body is constant and only its direction is changing. Example: Centripetal acceleration is perpendicular to velocity.

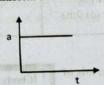


Uniform Acceleration:

Body is moving with uniform acceleration when its velocity changes equally in equal intervals of time.

Some important graph for uniform acceleration are shown in figure below









Instantaneous Acceleration

Acceleration of a body at any particular instant of time.

$$\vec{a}_{ins} = \lim_{\Delta t \to 0} \frac{\Delta \vec{v}}{\Delta t}$$

Acceleration is not zero when either magnitude or direction of velocity changes

Acceleration, change in velocity, force and impulse are always in same direction

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DISPLACEMENT-TIME GRAPH:

- > Graph which illustrates the variation in displacement with time.
- > Its slope represents the velocity.

Some Important Examples of Displacement- Time Graph

G	raph	Velocity	Slope	Acceleration
d.		Zero	Zero	Zero
do	t	Constant	Constant	Zero
ª L)	Increasing	Increasing	Positive
4	t	Decreasing	Decreasing	Negative
1	·	First decreasing then increases	First decreasing then increases	Negative and constant
Example: If	the display	Negative and constant	Negative and constant	Zero

displacement time graph of two moving gangle 30° and 60° with time axis then the Solution: $\frac{\nu_1}{\nu_2} = \frac{\tan 30}{\tan 60}$. bodies are making angle 30° and 60° with time axis then the ratio between their velocities will be (a) 1:√3

(c) 1:3

(d) √3:1

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(b) 3:1

VELOCITY-TIME GRAPH

- > Graph which illustrates the variation in velocity of the variation in velocity of the body
- \triangleright Slope of v t graph = acceleration.
- ightharpoonup Area under v t graph = distance covered.

Some Important Examples of Velocity-Time Graph

Graph	Velocity	Slope	Acceleration
v • • • • • • • • • • • • • • • • • • •	Constant $(v_i = v)$	Zero	Zero
*1/	Increasing	Positive and constant	Positive and constant
*	Increasing $(v_i = 0)$	Positive and increasing	Positive and increasing
*1	Increasing $(v_i = 0)$	Positive and decreasing	Positive and decreasing
· ·	First decreasing then increases in opposite direction $(v_i \neq 0)$	Negative and constant	Negative and constant
*	Increasing $(v_i \neq 0)$	Positive and constant	Positive and constan

Example 1:

The total distance and displacement covered from the

following v-t graph is +ve disp.

- (a) 50m, 50m
- (b) 50m, 30m
- (c) 30m, 50m
- (d) 50m, zero

Example 2:

If v-t graph for a body is shown in the figure below displacement is maximum for



(a) 1 (c) 3

(d) same for all

Example 3:

If v-t graph for two bodies is shown in the figure below then the ratio between their accelerations will be



(a) 1:1

(b) 1: √3

(c) 3:1

(d) √3:1

Solution:

distance = total area of triangles $=\frac{1}{2}(4)(10)+\frac{1}{2}(2)(10)$ $+\frac{1}{2}(4)(10)=50$

(Distance is always positive)

displacement = $\frac{1}{2}(4)(10)$ -

 $\frac{1}{2}(2)(10) + \frac{1}{2}(4)(10) = 30$

Solution:

 $S_1 > S_2 > S_3$

(جس گراف کے نج Area زیادہ ہوگاای

کا Displacement کی زیادہ کا)

a3> a2> a1

(جس گراف كى slope زياده حوگاس يس

(8 notice acceleration

Solution:

 $\frac{a_1}{a_2} = \frac{Tan\ 30^o}{Tan\ 45^o}$

Equations of Motion

1st Equation:

 $V_f = V_i + at$

(جب distance ندویا کیا او توباتی کی quantity کو معلوم کرنے کے لیے Equation استعال کریں)

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Example:

If a car accelerates uniformly from rest to a velocity 10ms⁻¹ in 50 sec. Then the acceleration of the car is

(a) 5 ms⁻¹

(b) 0.2 ms⁻²

(d) -0.2ms⁻² (c) 0.2 ms⁻¹

Solution:

 $v_i = v_i + at$

$$a = \frac{v_f - v_i}{t} = \frac{10 - 0}{50} = 0.2 \text{ms}^{-2}$$

2nd Equation:

$$S = v_i t + \frac{1}{2} a t^2$$

Example:

A ball is thrown vertically upward from a 100m high tower with velocity 5ms-1. The time taken by the ball to reach the ground will be

(a) 4s

(b) 5s

(c) 8s

(d) 10s

جود يكثر opposite _ initial velocity موع ان ك ساتحد لكعيس ك

Solution: $S = v_i t + \frac{1}{2} a t^2$

$$-100 = 5 t + \frac{1}{2} (-10) t^2$$

$$-20 = t - t^2 \rightarrow t^2 - t - 20 = 0$$

$$t^2-5t+4t-20=0$$

$$t(t-5)+4(t-5)=0$$

$$t - 5 = 0$$
 and $t + 4 = 0$

3rd Equation:

$$2as = v_f^2 - v_i^2$$

(جب " time " ندد یا گیامو توباق کی quantity کومعلوم کرنے کے (درستعال کرس) Equation

Example:

If a car moving with velocity 10ms⁻¹ is brought to rest in 25m distance then acceleration of the car will be

(a) 5 ms⁻²

(b) 0.5 ms⁻²

(c) 0.2 ms⁻²

(d) -0.5 ms⁻²

Solution:

$$2as = v_f^2 - v_i^2$$

$$2a \times 25 = (0)^2 - (10)^2$$

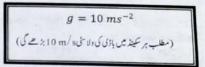
$$a = -0.5 \text{ ms}^{-2}$$

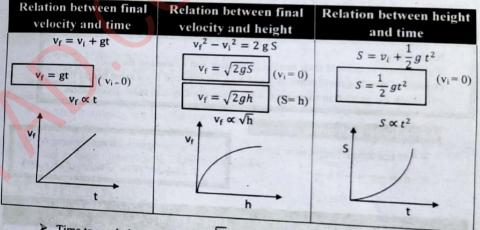
- Note:-These equations are only applicable for linear motion with uniform acceleration.
- Note:-Quantities opposite to initial velocity are taken negative. For example when body is thrown upward then acceleration due to gravity is taken negative.

MOTION UNDER THE ACTION OF GRAVITY

(i) When body falls downward:

- > When body starts from rest or falls freely or dropped or is released then $v_i = 0$.
- When body is thrown $v_i \neq 0$.
- $\Rightarrow a = g = 9.8 \, m/s^2 \approx 10 \, m/s^2$





ightharpoonup Time to reach the ground: $t = \frac{2s}{s}$ t = OR $t \propto \sqrt{h}$

Example:

UNIT 01

If a ball falling freely from a height "h" reaches the ground in 10 seconds then the time taken by the ball falling freely from height "2h" will be

- (a) 5 sec (c) 14 sec
- (b) 7 sec
- (d) 20sec

Solution: since $t \propto \sqrt{h}$

when height becomes two time then time will become $\sqrt{2}$ times $t = \sqrt{2} \times 10 = 14 \, sec$

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Distance covered in time t:

$$S = \frac{1}{2}gt^2$$

OR

$$S \approx 5t^2$$

Example

The distance covered by a freely falling body in three second is

- (a) 5m
- (b) 15m
- (c) 20m Solution:
- (d) 45m $S \approx 5t^2 = 5 \times 9 = 45m$

Distance covered in nth second:

$$S_{nth} = 10n - 5$$

Example

The distance covered by a freely falling body in 3rd second is

- (a) 5m
- (b) 15m
- (c) 20m
- (d) 45m

$$S = 10n - 5$$

= 10 × 3 - 5 = 20m

If air friction is ignored then motion is independent of mass of the body. For example if two bodies of mass 2kg and 4 kg are dropped from same height they will reach the ground in same time, with same velocity and same acceleration.

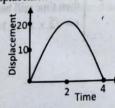
When body is thrown upward:

- ightharpoonup At maximum height $v_f = 0$.
- $\Rightarrow a = -g = -9.8 \frac{m}{s^2}$ $\approx -10m/s^2$

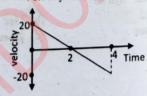
$$g = -10 \ ms^{-2}$$
 مطلب ہر سکینٹ میں باڈی کی وال سی $10 \ ms^{-1}$ کی ہوتی جائے گ

Time to reach maximum height:	Time of Flight	Maximum neight attained
$v_f = v_i + at$ At max. height $v_f = 0$ $t = \frac{v_i}{g}$	$S = v_i t - \frac{1}{2}gt^2$ For time of flight S = 0 $t = \frac{2v_i}{g}$	$v_f^2 - v_i^2 = -2gh$ At max, height $v_f = 0$ $h = \frac{v_i^2}{2g}$

Displacement Time Graph



Velocity Time Graph



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NEWTON'S LAWS OF MOTION

- > Sir Isaac Newton published his three laws of motion in 1687 in his book 'principia'
- > Newton's laws are empirical laws.
- > Newton's laws are not applicable for sub-atomic particles and motion with speed approaching to speed of light.

1st Law of Motion:

A body at rest will remain at rest and a body moving with uniform velocity, continue its motion unless acted upon by some unbalanced external force.

- > It gives the qualitative definition of force.
- > It is also known as law of inertia.

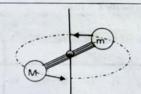
Inertia:

UNIT 01

- > Property of body tending to maintain its state of rest or uniform motion is called inertia.
- Mass of a body is quantitative measure of its inertia.

Example:

- A person standing in a bus falls backward due to inertia when bus suddenly starts moving.
- A person standing in a moving bus move forward due to inertia when brakes of the bus is applied suddenly.



Nobody moves or comes to

rest itself

(Abu-Ali- Sena)

A measurement of mass independent of gravity. When two masses are equal the rod will rotate without wobble about its center.

Inertial Frame of reference:

A frame of reference in which Newton's 1st law of motion valid.

> Non-accelerated frame ($\vec{v} = constant$) is inertial frame.

Example: A car moving with uniform velocity.

If both magnitude and direction of velocity are not changing then frame of reference is 'Inertial' In thrill machine rides at amusement parks there may be an acceleration of 3g or more. Without head rest this large acceleration may cause serious neck injury due to inertial effects.

Non-inertial Frame of reference:

A frame of reference in which Newton's 1st law of motion not valid.

► Accelerated frame ($\vec{v} \neq \text{constant}$) is non-inertial frame.

If either magnitude and direction of velocity are changing then frame of reference is 'Non-Inertial'

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2nd Law of Motion:

A force applied on a body produces an acceleration in its own direction. This acceleration is directly proportional to applied force and inversely proportional to mass of the body.

 $\vec{a} \propto \frac{\vec{F}}{\vec{r}} \Rightarrow \vec{F} = m\vec{a}$

- Gives the definition of mass.
- > Direction of acceleration is always along the direction of force
- No force is needed to continue the motion of the object
- Force is only needed to change the motion (velocity) of the object.

Velo	city	Cha	nge
v elo	CILY	CHA	

Force is parallel to velocity		v or speed increases. Direction of velocity remains same.
Force is anti-parallel to velocity	F V	v or speed decreases. Direction of velocity remains same.
Force is perpendicular to velocity	F†	v or speed remains constant. Only direction of velocity change.
Force acts at some angle with velocity	, the state of the	Both magnitude and direction of velocity changes.

3rd Law of Motion:

"Every action has equal and opposite reaction". $(\vec{F} = -\vec{F})$

- > Action and reaction always act on different bodies.
- According to 3rd law forces always exist in pairs.
- > Action and reaction act on the line joining the two bodies.
- > Action and reaction never balance each other.

Example: Swimming is an example of Newton's law of motion

- (a) first
- (b) second
- (c) third V

(d) all of these

Throwing a package from a boat

(Newton's third law)

causes the boat to move backward

MOMENTUM

- > The moving object possess a quality by virtue of which it exerts a force on anything that tries to stop it. Quality was called quantity of motion of the body by Newton. Now it is called linear momentum.
- > Product of mass of body and its velocity is called momentum.

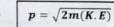
 $\vec{p} = m\vec{v}$

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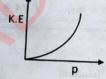
By AZHAR IQBAL0336-7098894

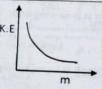
- > It is vector quantity and its direction is along the direction of velocity.
- > Its SI unit kgms-1 or N.s
 - If two bodies have same mass then $p \propto v$. The body moving faster will have larger momentum and vice versa.
 - If two bodies are moving with same speed then $p \propto m$ and heavier body will have larger momentum and vice versa.
 - If two bodies are moving with same momentum then $v \propto \frac{1}{m}$ and lighter body is moving faster and vice versa.
- K.E and momentum are related as





$K.E \propto \frac{1}{m}$ p	$\propto \sqrt{m}$
α	$\propto \frac{1}{m}$ p







Newton's 2nd Law in terms of momentum

"Time rate of change of momentum of a body" is equal to applied force.

$$\vec{F} = \frac{\Delta p}{\Delta t}$$

$$\vec{F} = \frac{m\vec{v}_f - m\vec{v}_i}{t}$$

- > This is the most general form of Newton's 2nd law of motion.
- > Force is directly proportional to change in momentum of the body.
- > Force is inversely proportional to time of impact.

Examples:

- > Helmet increases time of impact and reduces the force on the head to avoid serious
- ➤ Hair act like crumple zone, they increase the time of impact thus reduces the force. A force of 5N might be enough to fracture your naked skull (cranium) but with a covering of skin and hair a force of 50N would be needed.
- Air bags in cars increases the time of impact and thus reduces the force.

In knocking a bear down Lead bullet is more effective than rubber bullet of same momentum because time of impact for lead bullet is small and it will exert greater force

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velocities \vec{v}_1 and \vec{v}_2 after the collision then

Example 1: Spring is compressed between

two masses $p_i = 0$, when spring is released

Example 2: Consider a bomb of mass 4kg

initially at rest explodes into two pieces of

masses 1kg and 3kg as shown in the figure

 $\vec{p}_1 = -\vec{p}_2$ (Both masses will have

equal and opposite momentum)

(a)1:-1 (b)1:3 (c) 3:1 (d) 1:1

Example 3: Consider a nucleus at rest

undergoes an alpha decay as shown in the

Example: what is ratio between the

magnitude of their momentum

If total initial momentum is zero. Then total final momentum is also zero.

> If masses m_1 and m_2 are moving with velocities \vec{v}_1 and \vec{v}_2 before the collision and with

When a fighter plane chasing another opens fire is speed and momentum decreases

 $\vec{p}_1 = -\vec{p}_2$

opposite momentum) $p = mv \Rightarrow v \propto \frac{1}{2}$

(iii) $K.E = \frac{p^2}{2m} \implies K.E \propto \frac{1}{m}$

 $p = mv \Rightarrow v \propto \frac{1}{}$

Example: what is ratio between the

(iii) $K.E = \frac{p^2}{2m} \Rightarrow K.E \propto \frac{1}{m}$

(b)1:3

magnitude of their velocities

(a)1:-1 (b)1:3

(Both masses will have equal and

(Lighter body will have greater K.E)

(c) 3: 1 V

(c) 3: 1 ✓ (d) 1: 1

(d) 1:1

(Lighter body will move faster)

(Lighter body will move faster)

When pursued plane returns the fire its speed and momentum increases

 $m_1\vec{v}_1 + m_2\vec{v}_2 = m_1\vec{v}_1 + m_2\vec{v}_2$

UNIT 01

Special Case:

then

below

figure

Impulse:

- Product of force and small interval of time (t) is called impulse.
- \Rightarrow Impulse = $\vec{F} \times t$
- > It is vector quantity and its direction is along the direction of force.
- > Its SI unit is kams-1 or N.s.
- > Impulse and momentum have same units.
- > Impulse = change in momentum of the body:

$\vec{F} \times t = m\vec{v}_f - m\vec{v}_f$
--

Moving bodies may or may not have impulse

- If body is moving with uniform velocity it has no impulse.
- If body is moving with variable velocity its momentum changes and it will have impulse.

If body accelerates from rest	If body brought to rest
$v_i = 0$	$V_f = 0$
$\vec{\mathbf{f}} \times \mathbf{t} = \mathbf{m} \vec{\mathbf{v}}_{\mathbf{f}}$	$\vec{F} \times t = -m\vec{v}_t$

Example:

The force required to stop a body moving with a velocity v in a time t is 'F'. The force required to stop the same body in same time if it is moving with velocity 2v is

(a) F

(c) 4F (b) 2F√

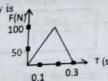
(d) F/2

> Area under force-time graph is equal to impulse.

Example:

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The graph between force and time for which force acts on the body is shown in the figure below. The change in the momentum of the body is



(a) 15 N- sec ✓ (b) 150 N- sec (c) 300 N-sec

Solution:

Since area under F-t graph is equal to impulse or change in momentum

$$\Delta p = \frac{1}{2}base \times height$$

$$\Delta p = \frac{1}{2} \times 0.3 \times 100$$

$$\Delta p = 15 N. sec$$

LAW OF CONSERVATION OF MOMENTUM

If no external force acts on the system then system is called isolated system.

Total linear momentum of an isolated system remains constant,

If
$$\vec{F}_{ext} = 0$$
 then $\frac{\Delta \vec{p}}{\Delta t} = 0$ or $\vec{p} = constant$

(Both magnitude and direction of linear momentum are conserved)

 $\vec{p}_1 = -\vec{p}_2$

energies?

(a)1:-1

(Both nucleus and alpha particle will have equal and opposite momentum)

(Lighter body will have greater K.E)

Example: what is ratio between their kinetic

- $p = mv \Rightarrow v \propto \frac{1}{2}$ (alpha particle will move faster due to smaller mass)
- (i). $K.E = \frac{p^2}{2m} \implies K.E \propto \frac{1}{m}$ (alpha particle will have greater K.E. due to smaller mass)

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If two bodies collide with eachother and after the collision they move together then their common velocity after the collision is as

$$v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$$

Example:

A 2500 kg truck moving with velocity 21ms⁻¹ collides with a stationary car of mass 1000 kg. The truck and car move together after the impact with common velocity

- (a) 5 ms⁻¹ (c) 10 ms⁻¹
- (b) 15 ms⁻¹ (d) 20 ms⁻¹

Solution:

$$v = \frac{m_1 v_1 + m_2 v_2}{m_1 + m_2}$$

$$v = \frac{2500 \times 21 + 1000 \times 0}{2500 + 1000}$$
$$v = 15 \text{ ms}^{-1}$$

ELASTIC COLLISION

- > A collision in which total K.E of the system is conserved is called elastic collision.
- > A bouncing ball will rebound to its original height.
- > During elastic collision none of K.E is converted into other forms of energy such as sound energy, heat energy etc.

Inelastic Collision:

- > A collision in which total K.E of the system is not conserved is called inelastic collision.
- > A bouncing ball will not rebound to its original height.
- K.E is converted into other forms of energy.

Note:

Total Energy and momentum remain conserved in both elastic and inelastic collisions.

ELASTIC COLLISION IN ONE DIMENSION

Consider two non-rotating balls moving in same direction collide with each other and after the collision they move along same line without rotation then



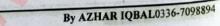
Before Collision



$$v_1 + v_1' = v_2 + v_2'$$

(If any three velocities are given you can find the fourth)

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- > Relative velocities before and after the collision have same magnitude but opposite direction. $v_1 - v_2 = -(v_1' - v_2')$
- > Magnitudes of relative velocity of approach is equal to magnitude of relative velocity of separation.

FORCE AND MOTION

> Velocities after the collisions are:

$$\mathbf{v_1'} = \frac{(m_1 - m_2)\mathbf{v_1}}{m_1 + m_2} + \frac{2m_2\mathbf{v_2}}{m_1 + m_2}$$

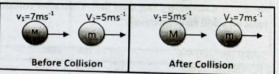
$$\mathbf{v_2}' = \frac{2m_1\mathbf{v_1}}{m_1 + m_2} + \frac{(m_2 - m_1)\mathbf{v_2}}{m_1 + m_2}$$

Four Special Cases

1st Case:

When two bodies of equal mass collide with each other they exchange their velocities after collision.

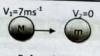
$$M = m$$



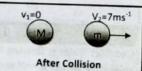
2nd Case:

When a moving ball collides with a stationary ball of equal mass they exchange their velocities after collision.

$$M = m$$



Before Collision

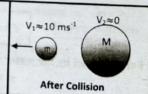


3rd Case:

When a moving lighter ball collides with heavier ball initially at rest then after the collision lighter ball moves backward with same velocity while heavier ball will remain at rest



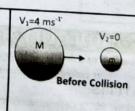


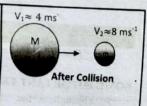


4th Case:

When a moving heavier ball collides with lighter ball initially at rest then after the collision velocity of heavier ball remains same while lighter ball will move with double velocity of heavier ball







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Example:

A 70 g ball is moving with a velocity of 9 ms⁻¹ collides elastically with another ball of mass 140 g which is initially at rest. Then after collision their velocities will be respectively?

Solution: V2=0

$$v_1' = \frac{(m_1 - m_2)v_1}{m_1 + m_2}$$

$$v_1' = \frac{(70-140)9}{70+140} - 3 \text{ ms}^{-1}$$

$$\mathbf{v_2'} = \frac{2m_1\mathbf{v_1}}{m_1 + m_2}$$

$$v_2' = \frac{2 \times 70 \times 9}{70 + 140} = 6 \text{ms}^{-1}$$

Example:

A 100 g golf ball is moving with velocity of 20 ms⁻¹ collides elastically a stationary 8kg steel ball. Then after collision their velocities will be respectively?

Solution: V2=0

$${\bf v_1'} = \frac{(m_1 - m_2){\bf v_1}}{m_1 + m_2}$$

$$v_1' = \frac{(100 - 8000)20}{100 + 8000} - 19.5 \text{ ms}^{-1}$$

$$v_2' = \frac{2m_1v_1}{m_1 + m_2}$$

$$v_2' = \frac{2 \times 100 \times 20}{100 + 8000} = 0.5 \text{ms}^{-1}$$

FORCE DUE TO WATER FLOW

Consider water is flowing through a horizontal pipe with velocity v strikes a wall normally and comes to rest then

Force exerted by the wall on the water is given as

$$F = \frac{mv_f - r}{t}$$

$$F = \frac{-mv}{t}$$

Force exerted by the water on the wall is given as

$$F = \frac{mv_i}{t}$$

$$F = \frac{m}{t}v$$

PROJECTILE MOTION

"Two dimensional motion of a body under constant acceleration due to gravity is called projectile motion".

SOME IMPORTANT FEATURES:

Throughout the motion the acceleration is constant (a = g) and directed vertically



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- > Vertical components of velocity continuously changes with time
- > Horizontal component of the velocity always remains constant.
- > Horizontal component of acceleration remains zero.
- > For short range the trajectory or path of projectile is parabola.
- > For long range the trajectory or path of projectile is elliptical.

Case-1:

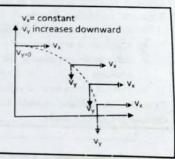
UNIT 01

If a body is projected in horizontal direction with velocity vx.

- > It moves forward due to inertia.
- > It moves downward due to gravity

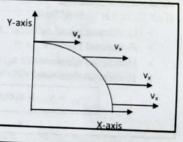
Example: A bomber moving in horizontal direction drops a bomb when it is just above its target but he misses the target due to

- (a) horizontal velocity
- (b) inertia
- (c) gravity
- (d) both a and by



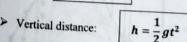
Horizontal Motion:

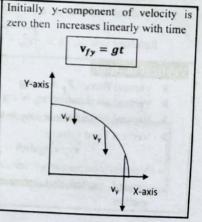
- > If air friction is ignored then force along X-axis remains zero : $F_x = 0$
- Horizontal component of acceleration is always zero. $a_x = 0$
- > Horizontal component of velocity remains constant (horizontal component of velocity is same at all the points)



Vertical Motion:

- Force along y-axis: $F_y = mg$
- \triangleright Acceleration along y-axis: $a_y = g$
- > Initial vertical velocity is zero and it increases with time.
- ➤ Vertical final velocity: $v_{fy} = \sqrt{2gh}$





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> Resultant acceleration: $a = \sqrt{a_x^2 + a_y^2} = \sqrt{0 + g^2} = g$

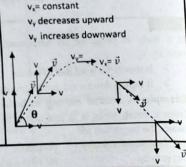
> Resultant velocity: $\mathbf{v} = \sqrt{\mathbf{v}_x^2 + \mathbf{v}_y^2} = \sqrt{\mathbf{v}_x^2 + g^2 \mathbf{t}^2} = \sqrt{\mathbf{v}_x^2 + 2gh}$

Case-2:

Consider Body is projected at an angle " θ " with the horizontal and initial velocity vi

- $\triangleright \theta$ is known as angle of projection
- > vi is known as velocity of projection
- > horizontal component of velocity remains
- vertical component of velocity vary with time

Example: A ballistic missile fired from a certain distance at a certain angle.

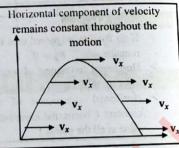


Horizontal motion:

If air friction is ignored then.

- \triangleright Horizontal initial velocity: $\mathbf{v}_{ix} = \mathbf{v}_i \mathbf{cos} \boldsymbol{\theta}$
- ➤ Horizontal force: F_x = 0
- \rightarrow Horizontal acceleration: $a_x = 0$
- ➤ Horizontal final velocity:

$$\mathbf{v}_{fx} = \mathbf{v}_{ix} = \mathbf{v}_i \cos \theta$$



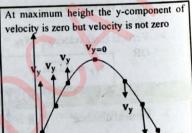
Resultant acceleration: $a = \sqrt{a_x^2 + a_y^2} = \sqrt{0 + (-g)^2} = g^{-1}$ Resultant velocity: $\mathbf{v} = \sqrt{\mathbf{v}_{fx}^2 + \mathbf{v}_{fy}^2} = \sqrt{(\mathbf{v}_i \mathbf{cos}\theta)^2 + (\mathbf{v}_i \mathbf{sin}\theta - \mathbf{gt})^2}$

Vertical motion:

- \triangleright Vertical Force: $F_v = -mg$
- \triangleright Vertical acceleration: $a_y = -g$
- \triangleright Vertical initial velocity: $\mathbf{v}_{i\mathbf{v}} = \mathbf{v}_{i} \mathbf{sin} \boldsymbol{\theta}$
- ➤ Vertical Final velocity:

$$v_{fy} = v_i \sin\theta - gt$$

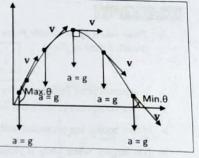
> Vertical component of velocity decreases in upward motion and increases in downward



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Angle between velocity & acceleration:

- > Angle between velocity and acceleration of projectile is maximum at point of projection.
- > Angle between velocity and acceleration decreases with time
- At maximum height velocity and acceleration are perpendicular to each other.
- > At the point where the body hits the ground the angle between velocity and acceleration is minimum.



At max height

UNIT 01

- Y-component of velocity = 0.
- \triangleright Velocity is minimum and $\mathbf{v} = \mathbf{v}_i \cos \theta$.
- ➤ Angle between velocity and acceleration is 90°

$$P.E = mgh = mg\left(\frac{v_i^2 sin^2 \theta}{2g}\right) = \frac{1}{2} mv_i^2 sin^2 \theta$$

 $K.E = \frac{1}{2}m(v_i\cos)^2 = \frac{1}{2}mv_i^2\cos^2\theta$

Maximum Height:

(Maximum distance covered by a projectile in vertical direction is called maximum height)

$$H = \frac{{v_i}^2 sin^2 \theta}{2g}$$

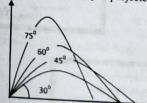
- > It depends upon initial velocity, angle of projection and acceleration due to gravity.
- > If two bodies are projected at same angle then

$$H \propto v_l^2$$
 and $\left(\frac{H_1}{H_2} = \frac{v_1^2}{v_2^2}\right)$

> If two bodies are projected with same speed then

$$H \propto \sin^2 \theta$$
 and $\left(\frac{H_1}{H_2} = \frac{\sin^2 \theta_1}{\sin^2 \theta_2}\right)$

ightharpoonup H is largest when body is projected vertically upward ($\theta = 90^{\circ}$) and $H_{max} = \frac{v_t^2}{2g}$.





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Time of Flight:

- > Time taken by projectile from its point of projection to the point where it hit the ground is called time of flight.
 - 2visin0
- > It depends upon initial velocity, angle of projection and acceleration due to gravity.
- > If two bodies are projected at same angle then $t \propto v_1 \left(\frac{t_1}{t_2} = \frac{v_1}{v_2}\right)$.
- > If two bodies are projected with same speed then $t \propto \sin\theta \left(\frac{t_1}{t_2} = \frac{\sin\theta_1}{\sin\theta_2}\right)$.
- > It is largest when body is projected vertically upward $(\theta = 90^{\circ})$ and $t_{max} = \frac{2v_1}{g}$.

Note
Time to reach maximum height is
$\frac{v_i sin\theta}{g}$.

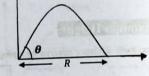


Horizontal Range:

Maximum distance covered by projectile in horizontal direction is called range

$$R = v_{ix}t$$
 or

or
$$R = \frac{v_i^2 \sin 2\theta}{g}$$



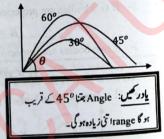
- > It depends upon initial velocity, angle of projection and acceleration due to gravity.
 - > If two bodies are projected with same speed then

$$R \propto \sin 2\theta$$
 and $\left(\frac{R_1}{R_2} = \frac{\sin 2\theta_1}{\sin 2\theta_2}\right)$

> If bodies are projected at same angle then

$$R \propto v_i^2$$
 and $\left(\frac{R_1}{R_2} = \frac{v_1^2}{v_2}\right)$

> Range of projectile is maximum when body is projected at 45° and $R_{max} = \frac{v_i^2}{g}$



Note: For some of initial speed, angle of projections for which $\theta_1 + \theta_2 = 90^\circ$, Horizontal ranges are equal. Example: At 30° and 60° horizontal ranges are equal.

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Relation between maximum height and range:

$$H = \frac{1}{4}Rtan\theta$$

 $H = \frac{1}{4}R_{max}$ (For maximum range $\theta = 45^{\circ}$ and $\tan 45^{\circ} = 1$)

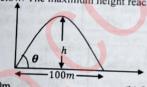
FORCE AND MOTION

For $\theta = 76^{\circ}$ maximum height and range are equal.

Example:

UNIT 01

The trajectory of a ball thrown at an angle of 45° is shown in the figure below. The maximum height reached by the ball is



(a) 100m (c) 400m

(b) 200m

(d) 25m

Solution:

$$H = \frac{1}{4}R \tan\theta$$
$$= \frac{1}{4} \times 100 \times \tan 45$$

$$H = 25m$$

Example:

The range of projectile will be four times the height of projectile at an angle of

Solution:

$$H = \frac{1}{4}R \tan\theta$$

$$H = \frac{1}{4} \times 4H \tan\theta$$

$$\tan\theta = 1 \text{ or } \theta = 45^{\circ}$$

Example:

If the range of projectile and height of projectile are related as $R = \frac{4H}{\sqrt{3}}$ then angle of projection will be

Solution:

$$H = \frac{1}{4}R \tan\theta$$

$$H = \frac{1}{4} \times \frac{4H}{\sqrt{3}} \tan\theta$$

$$\tan\theta = \sqrt{3}$$

Relation between maximum height and time of flight:

$$H = \frac{1}{8}gt^2$$

Example:

If the ratio between time of flight of two different bodies is 2:3 then the ratio between their maximum height will be

Solution:

 $H \propto t^2$ Ratio between height is determined by taking square of the ratio between time

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UNIT 01

FORCE AND MOTION

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If time of flight of a projectile is four seconds the maximum height reached by projectile is

(a) 10m

(b) 20m

(c) 40m

 $H = \frac{1}{2}gt^2$

$$H = \frac{1}{8} \times 10 \times (4)^2$$

$$H = 20m$$

Solution:

Relation between Range and Time of flight:

$$R \tan\theta = \frac{1}{2} gt^2$$

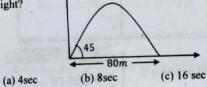
$$R_{max} = \frac{1}{2}gt^2$$

(d) √8sec

(d) 50m

Example:

Trajectory of a body is shown in the figure below. What is its time of flight?



Solution:

 $R \tan\theta = \frac{1}{2} gt^2$

$$80 \times Tan45$$
$$= \frac{1}{2} \times 10 \times t^2$$

$$t^2 = 16$$

Ballistic Flight:

Ballistic flight is that in which projectile is given an initial push and then allowed to move freely due to inertia and under action of gravity.

Ballistic Missile:

The unpowered and unguided missile is called ballistic missile.

- > The ballistic missiles are useful only for short ranges.
- Powered and remote controlled guided missiles are used for long ranges and greater precision.

Ballistic Trajectory:

The path followed by ballistic missile is called ballistic trajectory.

If we consider earth as a flat surface, the shape of trajectory is parabolic and its range is short. If we consider earth spherical, the shape of trajectory is elliptical.

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UNIT 02

WORK AND ENERGY

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UNIT $02 \rangle$

WORK AND ENERGY

WORK DONE BY CONSTANT FORCE

"The product of magnitude of displacement and component of force in the direction of displacement is called work done on the body."

Work is scalar quantity and its unit is Joule.

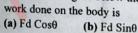


In cgs system unit of work is erg.

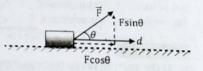
$$1erg = 10^{-7}J$$

Example:

If a body is moving under the action of constant force as shown in the figure below then the



(c) Fd Tano (d) - Fd Cosθ

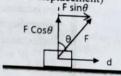


$$W = (Fcos\theta)(d)$$

$$W = Fdcos\theta = \vec{F}.\vec{d}$$

Solution: W=displacement(component of force parallel to displacement)

 $= Fd sin\theta$



Example:

At what angle between force and displacement more work is done.

(b) 40°

(d) 80°

Example:

At what angle between force and displacement the work done on the body is just 50% of maximum work

(a) 30° (c) 60°

(b) 45°

(d) 90°

Solution:

smaller the angle, larger the value of Cost

Work will be maximum when angle is smallest

Solution:

Sine value of Cos60°=1/2 Hence work done is 50% when $\theta = 60^{\circ}$

Positive work:

If the angle between force and displacement is less than 90° then work is positive.

Example:

If the angle between force and displacement of the body is 30° then work done will be (c) negative (d) minimum

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Work done in term of rectangular components

 $W = \vec{F} \cdot \vec{d} = (F_x d_x + F_y d_y + F_z d_z)$

Negative work:

If the angle between force and displacement is greater than 90° then work is negative. (Work done by friction is always negative) .

Example:

If a body is moving under the action of constant force as shown in the figure below then the work done on the body is

- (a) positive
- (b) negative
- (d) minimum (c) maximum

Solution:

Since the angle between force and displacement is greater than 90°. Hence work done will be negative.

Zero work:

1. If the angle between force and displacement is 90° then work is zero.

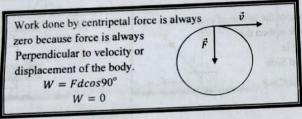
Example:

Work done by magnetic force on a moving charge in a magnetic field is always

(a) positive (b) negative (c) zero (d) none of these

Solution:

Magnetic force on a moving charge is always perpendicular to velocity or displacement.



2. If the body covers no displacement then work is zero.

Example:

Work done by a man pushing the rigid wall is zero because

(a) force is zero

- (b)√ displacement is zero
- (d) force and displacement are perpendicular
- 3. If force acting on the body is zero (body is moving with uniform velocity or speed) then work done on it is zero

Example:

If a car is moving with uniform velocity then work done on the car by Engine ,Friction and net force is respectively

- (a) positive, negative, positive
- (b) positive, negative, negative
- (c) positive, negative, zero
- (d) positive, zero, positive

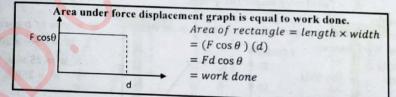
Solution:

Work done by Engine = $Fd\cos 0^\circ = +Fd$. Work done by Friction = $Fd\cos 180^\circ = -Fd$. Net work done = 0 (As car is moving with uniform velocity so

a = 0 and $F_{net} = 0$)

Solution:

 $\vec{d} = \vec{r}_f - \vec{r}_i$ $=(5\hat{\imath}-2\hat{\jmath})-(2\hat{\imath}+3\hat{\jmath})=3\hat{\imath}-5\hat{\jmath}$ $W = \vec{F} \cdot \vec{d} = (4\hat{\imath} + 6\hat{\jmath}) \cdot (3\hat{\imath} - 5\hat{\jmath})$ = (4)(3) + (6)(-5) = -181



Example:

(c) 40J

UNIT 02

Example:

(a) 9 J

(c) 18 J

The graph between displacement and component of force in the direction of displacement for a body is shown in the figure below. F Cos (N

If a force $\vec{F} = 4\hat{\imath} + 6\hat{\jmath}$ displaces the body from point

p(2,3) to a point Q(5,-2) then what is work done.

(b) -9 J

(d) -18 J

Work done on the body is .(a) 20J (b) 30J

(d) 50J

Solution:

W = total area $W = (10 \times 2) - (2 \times 5)$ $+(2 \times 5)$ W = 20 - 10 + 10W = 201

WORK DONE BY VARIABLE FORCE

In most cases force is not constant throughout the displacement but it is variable.

(i) In stretching a spring. Work is done by variable force $(F \propto x)$. **Example:** Force – displacement graph for a body is shown

in the figure below. Work done on the body is (a) 7.5J

(b) 15J F(N) 100 (c) 7501 (d) 1500J 50 x (cm) 10

Solution:

W = area of triangle

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(ii) A rocket moving away from earth. Work is done by variable force $(F \propto \frac{1}{r^2})$.

(iii) Two positive point charges are brought closer to each other. Work is done by variable force $(F \propto \frac{1}{2})$.

To calculate work done by variable force there are two methods.

I. we divide the path into small intervals so that in each interval force approximately remains constant then we calculate work done during each interval by using relation

$$W_i = \overrightarrow{F_i} \cdot \Delta \overrightarrow{d_i} = F_i \Delta d_i \cos \theta_i \text{ then}$$

$$W_t = \sum_{i=1}^n F_i \Delta d_i \cos \theta_i$$

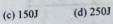
displacement and plot a graph between force $W_t = Total$ area under the graph.

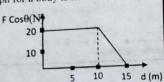
Example:

Force - displacement graph for a body is shown in the figure below. Work done on

the body is (a) 50J

(b) 200J





Solution:

W = area of trapezium $W = \frac{10+15}{2} \times 20$ $W = 25 \times 10$ W = 2501

WORK DONE BY GRAVITATIONAL FORCE

> Region or space around the earth in which its gravitational force acts on the body is called gravitational field.

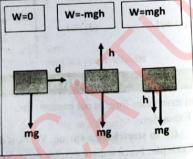
In the Gravitational Field:

- (i) If a body is displaced in horizontal direction, work done by gravity is zero.
- (ii) If body is displaced in upward direction then work done by gravity is negative

$$(W=-mgh).$$

(iii)If body is displaced in downward direction then work done by gravity is positive

$$(W = mgh)$$



Example:

A person holding a 10kg bag covers a displacement 5m in horizontal direction. How much work is done by gravity

(a) 50J

(b) 500J

(c) -500J

(d) zero

Solution:

Since force of gravity is perpendicular to displacement Hence work is zero

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(i) Work done by gravity is independent of path followed.

Along path1:

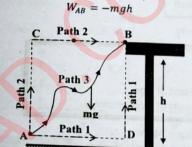
UNIT 02

$$W_{AB} = W_{AD} + W_{DB} = 0 + (-mgh) = -mgh$$
Along path2:

$$W_{AB} = W_{AC} + W_{CB} = (-mgh) + 0$$
$$= -mgh$$

Along path3:

$$W_{AB} = -mg(total\ verical\ displacement)$$

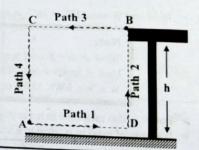


Work done by Gravity in a closed path is zero

$$W_{ADBCA} = W_{AD} + W_{DB} + W_{BC} + W_{CA}$$

$$W_{ADBCA} = 0 + (-mgh) + 0 + (+mgh)$$

$$W_{ADRCA} = 0$$



Conservative Force:

- > The force for which work done in closed path is zero is called conservative force.
- > The force for which work is independent of the path followed by the body is called

Examples:

Gravitational force, electric force, elastic force. are conservative forces.

Non-Conservative Force:

- Work done depends upon the path followed (Longer the path, larger the work).
- Work done in closed path is not equal to zero. Work done on aeroplane by air friction is not zero in a closed path and longer the path followed by aero plane, larger the work done by air friction.

Examples:

> Friction, Viscous force, Normal force, Tension, Air resistance, Propulsive force of rocket

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 p^2

POWER

"Rate at which work is being done.

OR Work done by a body per unit time is called power of the body."

> Average power:

$$P_{av} = \frac{Total\ work}{Total\ time} = \frac{W}{t}$$

> It is a scalar quantity. It is equal to dot product of force and velocity.

$$P = \vec{F}.\vec{v} = FV cos\theta$$

 $Its SI unit is watt (1W = Js^{-1} = kgm^2s^{-3}).$

Note:

Work done = Power × time

Unit of power × unit of time = unit of work

W.s, Wh, kWh, MWh etc. are units of work or energy.

- > Power is also measured in horse power.(1hp = 746 W)
- > If a body of mass m is lifted to a height h then power is given as

$$P=\frac{mgh}{t}.$$

If work done is equal to change in K.E.

$$P = \frac{\frac{i}{2}mv_2^2 - \frac{1}{2}mv_1^2}{t}$$

If work done is equal to change in P.E.

$$P = \frac{mgh_2 - mgh_1}{t}$$

Kilo-Watt Hour:

"One Kilowatt hour is work done in one hour by an agency whose power is one kilowatt."

$$1Wh = 3.6 \text{ kJ}$$
 $1kWh = 3.6MJ$ $1MWh = 3.6GJ$

Kilowatt hour is the commercial unit of electrical energy

ENERGY

Capacity of a body to do work is called energy.

- There are many types of energy such as K.E, P.E, sound energy, heat energy, electrical energy, chemical energy, solar energy etc.
- Mechanical energy can either be K.E or P.E
- > It is a scalar quantity

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- > Its SI unit is joule $(1J = N.m = kg m^2 s^{-2})$
- > Work and energy have same units.

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Kinetic Energy

UNIT 02

"Energy possessed by a body due to its motion is called kinetic energy."

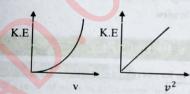
> Kinetic energy cannot be negative:

In terms of velocity



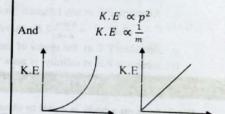
It depends upon mass of the body and its velocity

$$K.E \propto v^2$$
 $K.E \propto m$



In terms of momentum

$$K.E = \frac{P^2}{2m}$$



Potential Energy

And

Energy possessed by a body due to its position in the force field or due to its

- > P.E is always determined relative to some reference point where P.E is taken zero.
- > Reference point can be chosen anywhere.

NOTE:

P.E due to force of attraction is always negative P.E due to force of repulsion is always positive

Examples:

- o Gravitational P. E = mgh (if surface of earth is taken as a reference point)
- Absolute gravitational $P.E = -\frac{GMm}{2}$ (if reference point is taken at infinity where force of gravity is zero)
- Elastic $P.E = \frac{1}{2}kx^2$
- Electrical P.E between two point charges = $\frac{kq_1q_2}{q_1q_2}$
- Electrical P.E stored in capacitor = $\frac{1}{2}CV^2$
- Magnetic P.E stored in an Inductor = $\frac{1}{2}LI^2$
- Energy stored in compressed or stretched spring is called elastic P.E.



ABSOLUTE POTENTIAL ENERGY

"Absolute P.E at any point is defined as work done by gravitational field in moving the object from that point to infinity where force of gravity becomes zero."

o Absolute P.E at any distance r from the center of earth is given as

$$P.E = -\frac{GMm}{r}$$

(absolute P.E is always negative)

o Absolute P.E on the surface of earth is given as

$$P.E = -\frac{GMm}{R}$$

o Absolute P.E at any height h from the surface of earth is given as

 $P.E = -\frac{GMm}{R+h}$ (by increasing the height absolute P.E increases)

- Absolute P.E at the center of earth is zero.
- o Absolute P.E at infinity is zero.

WORK ENERGY PRINCIPLE

Work done on a body is equal to change in its energy .

$$W = \Delta K.E + \Delta P.E$$

- > If work done on the body is positive then its energy increases.
- ➤ If work done on the body is negative then its energy decreases.
- ➤ If work done on the body is zero then its energy remains constant.

Case 1:

If work done by conservative force is zero then P.E=0 and

$$W = \Delta K. E$$

OR
$$Fd = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2$$

- > If work done on the body is positive then its K.E increases.
- > If work done on the body is negative then its K.E decreases.
- > If work done on the body is zero then its K.E remains constant.

If body is accelerated from rest then $v_i = 0$

$$Fd = \frac{1}{2}mv_f^2$$

If body is brought to rest $v_f = 0$

$$Fd = -\frac{1}{2}mv_i^2$$

Case 2:

If work is done by conservative force while keeping the body in equilibrium then K.E=0 $W = \Delta P.E$ and

$$W = mgh_2 - mgh_1$$

- > If work done on the body is positive then its P.E increases.
- > If work done on the body is negative then its P.E decreases.
- > If work done on the body is zero then its P.E remains constant.

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Example:

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If 1000N force is required to stop a car moving with velocity 10ms-1then the force required to stop the car in same distance when it is moving with velocity 20ms- will be

(a) 500N

- (b) 1000N
- (c) 2000N
- (d) 4000N

Example:

What is force required to accelerate an object of mass 1kg from rest to a velocity 4ms in a distance 10m

- (a) 0.4 N (c) 4 N
- (b) 0.8 N
- (d) 8 N

Solution:

$$Fd = -\frac{1}{2}mv_l^2$$

As 'd' and are same so

 $F \propto v^2$

If v is doubled then F becomes 4 times $(4 \times 1000 = 4000N)$

Solution:

$$Fd = \frac{1}{2}mv_f^2$$

$$F \times 10 = -\frac{1}{2} \times 1(4)^2$$
$$F = 0.8N$$

INTERCONVERSION OF K.E AND P.E.

In the absence of air friction

If a body of mass m falls under the action of gravity from a height h as shown in the figure.

- Loss in P.E is equal to gain in K.E.
- > Total energy always remains constant.

After falling downward distance X

- \triangleright Loss in P.E = mgx
- \rightarrow % loss in P.E = $\frac{x}{h} \times 100$
- \triangleright Gain in K.E = mgx
- > % Gain in K.E = $\frac{x}{h}$ × 100
- ➤ Gain in speed/velocity = $\sqrt{2gx}$

Velocity of object falling under gravity

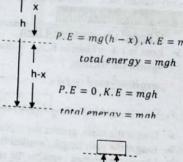
Gain in K.E = loss in P.E

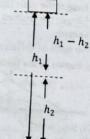
$$\frac{1}{2}m(v_2^2 - v_1^2) = mg(h_1 - h_2)$$

 \triangleright If at height h_1 body is moving with velocity v_1 then at height h2 velocity of the body will be

$$v_2 = \sqrt{2g(h_1 - h_2) + v_1^2}$$

If body falls from rest then $v_1 = 0$







$$v_2 = \sqrt{2g(h_1 - h_2)}$$

$$v \propto \sqrt{(h_1 - h_2)}$$

v ∝ √vertical distance

- > Velocity only depends upon initial and final height and is independent of mass of the body and path followed.
- \triangleright If body reaches the ground then $h_1 = 0$

$$v = \sqrt{2gh}$$

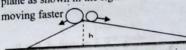
$$v \propto \sqrt{h}$$

LAW OF CONSERVATION OF ENERGY

Energy cannot be destroyed. It can be transformed from one kind to another but total amount of energy always remains constant.

Example:

Two balls of different masses rolls down from a frictionless plane as shown in the figure below then which balls is



- (a) bigger ball
- (c) ✓ both are moving with same speed
- (b) smaller ball
- (d) depend upon path length

Solution:

If body is thrown upward then

Loss in K.E = Gain in P.E +

Work done against the friction.

 $\frac{1}{2}mv^2 = mgh + fd$

$$v = \sqrt{2gh}$$

Velocity only depends upon height and is independent of mass of the body and path followed

In the Presence of friction

If body falls downward then

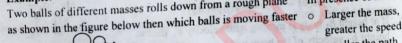
Loss in P.E = Gain in K.E + Work done against the friction.

$$mgh = \frac{1}{2}mv^2 + fd$$

- Figure 6. Gain in speed: $v = \sqrt{2\left(gh \frac{fd}{m}\right)}$
- > Larger the mass, greater the speed.
- Larger the path length, smaller the speed.
- > Larger the friction, smaller the speed

Solution:

Two balls of different masses rolls down from a rough plane



(a) bigger ball

Example:

- (c) both are moving with same speed
- (b) smaller ball
- (d) depend upon path length

- In presence of friction
- greater the speed. o smaller the path .

larger the speed

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UNIT 03 >>

ROTATIONAL AND CIRCULAR MOTION

Circular Motion:

"Motion of a body moving in circular path or motion of a body whose distance from axis of rotation remains constant is called circular motion".

Examples:

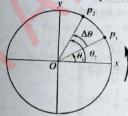
- Motion of satellites around the earth
- Motion of car moving on a circular track.
- Motion of stone tied with a string, rotating in a circular path.

ANGULAR DISPLACEMENT

"Angle subtended at the center in small internal of time or angle $\Delta\theta$ which gives the change in angular position of a body is called angular displacement".

Examples:

If body moves from point A to B on circular path then its angular displacement is $\Delta\theta$



Note One radian is the angle between two radii which cut off on the circumference an arc equal to radius

Note

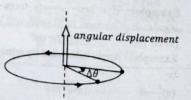
Rotational motion is either two or three dimensional motion and cannot be one dimensional.

- > SI unit of angular displacement is radian and other units are degree, revolution etc.
- For small value, angular displacement is vector quantity.
- > For large value angular displacement is not vector because it does not obey the vectors laws such as commutative law $(\theta_1 + \theta_2 = \theta_2 + \theta_1)$.

Example: if a body moves from one end of the diameter to other then angular (a)90° (b) 180° V (c) 270°

Right hand rule :

Direction of angular displacement is along axis of rotation and it is determined by right hand rule. (Rotate fingers in direction of rotation while keeping the thumb erect then thumb indicates the direction of angular displacement).



(d) 360°

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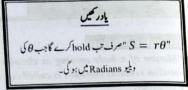


Rotation between Linear and Angular displacement:

If a particle moving in circular path of radius r, covers an arc length S and angular displacement θ then

$$S = r\theta$$

If a body is rolling without slipping then its linear distance is equal to arc length.



Examples:

If a wheel of radius 0.5m is rolling without slipping then its linear distance covered in 3-revolutions will be

(a)1.5m

- (b)2m

solution:

 $s = r\theta = 0.5 \times 3 \times 2\pi$ $=3\pi m = 9.4 m$

 $(1 rev = 2\pi rad)$

(c) 5.4m

(d) 9.4m

Conversion of degree into radian:

$$> 30^{\circ} = 30 \times \frac{\pi}{180} = \frac{\pi}{6} rad$$

$$> 45^{\circ} = 45 \times \frac{\pi}{180} = \frac{\pi}{4} \ rad$$

$$> 60^\circ = 60 \times \frac{\pi}{180} = \frac{\pi}{3} \, rad$$

Conversion of Radian into radian:

$$\Rightarrow \frac{\pi}{2} \text{rad} = \frac{180^{\circ}}{2} = 90^{\circ}$$

$$\pi \text{rad} = 180^{\circ}$$

$$\Rightarrow \frac{3\pi}{2} \text{ rad} = \frac{3 \times 180^{\circ}}{2} = 270^{\circ}$$

Some important conversions

$$> 1 \, rev = 360^\circ = 2\pi \, rad$$

$$> 1 \, rad = 57.3^{\circ}$$

$$> 30^{\circ} = \frac{\pi}{6} rad = \frac{1}{12} rev$$

>
$$45^{\circ} = \frac{\pi}{4} rad = \frac{1}{8} rev$$

$$> 60^\circ = \frac{\pi}{3} \ rad = \frac{1}{6} \ rev$$

$$90^{\circ} = \frac{\pi}{2} rad = \frac{1}{4} rev$$

>
$$180^{\circ} = \pi \, rad = \frac{1}{2} \, rev$$

Example1: if a body covers three revolutions in 5seconds then its | Solution: angular displacement in SI units will be

 $(a)\frac{3\pi}{2}$ rad $(a)\frac{6\pi}{5}$ rad

(a) 2π rad

 $(a)^{\frac{\pi}{2}}$ rad

- (a) 3π rad
- (a) 6π rad
- (a) 9π rad

(a) 2π rad

Example2: Angle subtended by minute hand of the clock in 15 minutes

 $3 \text{ rev} = 3 \times 2\pi \text{ rad}$ $=6\pi \text{ rad}$

Solution:

Angle in $15min. = 90^{\circ}$

$$=\frac{\pi}{2}$$
 rad

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ANGULAR VELOCITY:

Rate of change of angular displacement of body is called its angular velocity.



total angular displacement total time

$$\omega = \frac{\Delta \theta}{\Delta t}$$

Example 1: if a body covers three revolutions in 6 seconds then Solution: $\omega = \frac{\Delta \theta}{\Delta t}$ its angular velocity in SI units will be

(a)
$$2\pi$$
 rad

UNIT 03

(a) 4π rad

olutions in 6 seconds then
(a)
$$6\pi$$
 rad
(b) Solution: $\omega = \frac{\Delta\theta}{\Delta t}$

$$= \frac{3 \times 2\pi}{6} = \pi$$

- > SI unit of angular velocity is $rads^{-1}$ and other units are $degs^{-1}$ and $revs^{-1}$ etc.
- > Angular velocity is a vector quantity and its direction is along axis of rotation determined by right hand rule.
- Angular displacement and angular velocity are always parallel.

Relation with time period

$$\omega = \frac{2\pi \, rac}{T}$$

(اگر کی Rotating بائی کانائم پرید معلوم ہو تواس relation سعلوم کریں)

Angular velocity of second hand of clock	$\omega = \frac{2\pi rad}{1 min} = \frac{2\pi rad}{60 sec}$
Angular velocity of minute hand of clock	$\omega = \frac{2\pi rad}{60 min} = \frac{2\pi rad}{3600 sec}$
Angular velocity of hour hand of clock	$\omega = \frac{2\pi rad}{12 \times 60 min} = \frac{2\pi rad}{12 \times 3600 sec}$
Angular velocity of earth around its own axis	$\omega = \frac{2\pi rad}{1 day} = \frac{2\pi rad}{24 h}$
Angular velocity of earth around the sun	$\omega = \frac{2\pi rad}{1 year}$

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Uniform Angular Velocity:

If body covers equal angular displacement in equal intervals of time then body is rotating with uniform angular velocity.

Instantaneous Angular velocity:

Angular velocity of a body at any particular instant of time is called instantaneous angular velocity.

 $\omega = \lim_{\Delta t \to 0} \frac{1}{\Delta t}$

ANGULAR ACCELERATION

Rate of change of angular velocity of a body is called angular acceleration.

$$\alpha_{av} = \frac{Total\ change\ in\ angular\ velocity}{Total\ time}$$

$$\alpha_{av} = \frac{\Delta\omega}{\Delta t} = \frac{\omega_{f} - \omega_{i}}{t}$$

- > Angular acceleration is a vector quantity and its direction is always along the direction of direction of torque.
- ➤ SI unit of angular acceleration is rads⁻² and other units are degs-2 and revs-2

Angular acceleration کامطلب ے کہ باڈی کی ہر بیکنڈ میں کتی Angular velocity بڑھ رہی ہے۔

Linear acceleration is caused by force, similarly angular acceleration is caused by torque

 $\tau = I\alpha$

Uniform Angular Acceleration:

If angular velocity of a body changes equally in equal intervals of time then body is moving with uniform angular acceleration.

Instantaneous Angular Acceleration:

Angular acceleration of a body at any particular instant of time is called instantaneous angular acceleration.

 $\alpha_{ins} = \lim_{\Delta t \to 0} \overline{\Delta t}$

If angular	velocity is
increasing	then angular
	on is positive and
	angular velocity
14	φw

If angular velocity is decreasing then acceleration is negative and anti-parallel to angular velocity.

If angular velocity is constant then angular acceleration is zero and net torque acting on the body is also zero







If w is constant

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Note: A body moving in a circular path may have:

- Tangential acceleration (due to changing speed of the
- Angular acceleration (due to changing angular velocity of the body).
- Centripetal acceleration (due to changing direction of linear velocity of the body).
- iv. a_t , a_c and α are always mutually perpendicular.

If body is moving in circular path with uniform speed or uniform angular velocity then body has only centripetal acceleration due to changing direction of velocity and $\alpha = 0$ and $a_t = 0$

RELATION BETWEEN LINEAR AND ANGULAR VARIABLES

i.
$$S = r\theta$$

ii.
$$\mathbf{v}_t = r\boldsymbol{\omega}$$
 or $\vec{\mathbf{v}}_t = \vec{r} \times \boldsymbol{\overline{\omega}}$

 $\mathbf{v}_t = r\omega$ or $\vec{\mathbf{v}}_t = \vec{r} \times \vec{\omega}$ $(\vec{\mathbf{v}}_t, \vec{r} \text{ and } \vec{\omega} \text{ are always perpendicular to each other})$

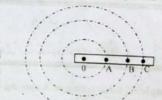
iii.
$$a_t = r\alpha$$
 or $\vec{a}_t = \vec{r} \times \vec{\alpha}$

iii. $\mathbf{a}_t = \mathbf{r}\alpha$ or $\vec{\mathbf{a}}_t = \vec{\mathbf{r}} \times \vec{\alpha}$ $(\vec{\mathbf{a}}_t, \vec{\mathbf{r}})$ and $\vec{\alpha}$ are always perpendicular to each other)

Note: For a rotating rigid body, all particles of rigid body will have same angular displacement θ , angular velocity ω and angular acceleration α but values of S, v and a_t may be different depending upon the distance r.

$$\theta_A = \theta_B = \theta_C$$
 $\omega_A = \omega_B = \omega_C$
 $\alpha_A = \alpha_B = \alpha_C$
But

 $S_C > C$
 $V_C > C$



Equations of motion for angular motion:

Equation:

$$\omega_{\rm f} = \omega_{\rm i} + \alpha t$$

П. Equation:

$$\theta = \omega_{\rm i} t + \frac{1}{2} \alpha t^2$$

III. Equation:

$$2\alpha\theta = \omega_f^2 + \omega_i^2$$

-USuse of 1st equation Jott Sale without B

without ωf علوم كر العول equation علوم كر العدو without ωf

without time معلوم كرناموة equation معلوم كرناموة

Limitations:

These equations are applicable only if

- Angular acceleration α is uniform.
- ii. Axis of rotation does not change.

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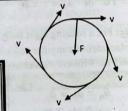
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	I was in or	relation for	angular mot	ion from line	ear motion	replace
То	determine a	Telation for		Elas F	p by L	K. E by K. Erot
S by θ	v bv ω	a by α	m by I	Fby τ	p by L	Itt B by m Brot

Relation	Linear Motion	Angular Motion	
1st Equation of motion	$v_f = v_i + at$	$\omega_{\rm f} = \omega_{\rm i} + \alpha t$	
2 nd Equation of motion	$S = v_i t + \frac{1}{2} a t^2$	$\theta = \omega_{\rm i} t + \frac{1}{2} \alpha t^2$	
3 rd Equation of motion	$2aS = v_f^2 - v_i^2$	$2\alpha\theta = \omega_f^2 + \omega_i^2$	
Newton's 2 nd law	$F = ma \ or \ F = \frac{\Delta P}{\Delta t}$	$\tau = i\alpha \text{ or } \tau = \frac{\Delta L}{\Delta t}$	
Momentum	p = mv	$L = I\omega$	
Work done	W = Fd	$W = \tau \theta$	
Kinetic energy	$K.E = \frac{1}{2}mv^2$	$K.E_{rot} = \frac{1}{2}I\omega^2$	

CENTRIPETAL FORCE

If a body is moving in a circular path then direction of its velocity is continuously changing with time. Hence there must be a force perpendicular to velocity that will change the direction of velocity.





بادی کی سپیٹریا direction کو تبدیل کرنے کے لیے force کا ہو ناضر وری ہے۔

Example: If force acting on a moving body is zero then its Path or trajectory will be

- (a) straight line (c) elliptical
- (b) circular
- (d) parabolic

Solution:

As force is zero so it will not change its direction and move in a Straight line

"Force needed to bend the normally straight path of a body into circular path is called centripetal force.

$$F_c = \frac{mv^2}{r}$$

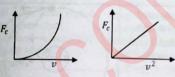
- Centripetal force is required force provided some agent to bend the body in circular path
- Direction of centripetal force is always directed towards the center but its direction is continuously changing with time.
- > Centripetal force is always perpendicular to velocity.
- Centripetal force always changes the direction of velocity it cannot change the speed of the body.

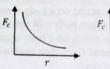
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> Centripetal force depends upon

•	Mass of the body	$F_c \propto m$	For greater mass, greater amount of force is required to bend the body in a circular path
•	Speed of the body	$F_c \propto v^2$	With greater speed, greater amount of force is required to bend the body in a circular path
	Radius of circular path	$F_c \propto \frac{1}{r}$	greater amount of force is required to bend the body in a circular path of shorter radius

Various types of graph for centripetal force :



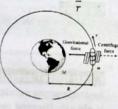




Example1:

Satellites revolving around the earth. Force of gravity provide the required centripetal force.

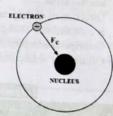




Example2:

Electrons revolving around the nucleus. Electric force provides the required centripetal force.

$$\frac{F_c = F_e}{mv^2} = \frac{Kq_1q_2}{r^2}$$



Example3:

A stone tied to a string moving in circular path. Tension in string provide required centripetal force.

$$Fc = T$$

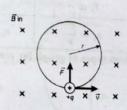


Example4: A charge moving in circular path in a magnetic field. Magnetic field force provides the required centripetal force.

$$F_{m} = F_{c}$$

$$qvB = \frac{mv^{2}}{r}$$

$$v = \frac{qBr}{r}$$







Example5:

A car moving in circular road. Force of friction provides the required centripetal force.

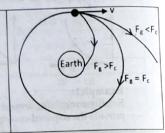
Banked tracks are needed for turns that are taken so quickly that friction alone cannot provide required centripetal force



Case i. If force acting on a body is equal to required centripetal force then body will move in circular path.

Case ii. If force acting on a body is greater than required centripetal force then body will fall towards the center of the circle.

Case iii. If force acting on a body is less than the required centripetal force then body will move out of circular.



Centripetal acceleration:

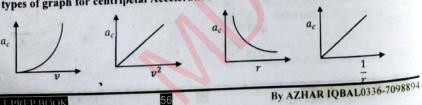
Instantaneous acceleration of the body moving in a circular path with uniform speed is always directed towards the center of the circle. It is known as centripetal

- Direction of centripetal acceleration is always directed towards the center but its direction is continuously changing with time.
- > Centripetal acceleration is always perpendicular to velocity.
- Centripetal acceleration is due to changing the direction of velocity.

Important Expressions for Centripetal Force

	In terns if angular speed	In terms of time period	In terms of momentum	In terms of K.E
$F_c = \frac{mv^2}{r}$ If $v = constant$	$F_c = mr\omega^2$ If $\omega = constant$ $F_c \propto r$	$F_c = \frac{4\pi^2 mr}{T^2}$	$F_c = \frac{p^2}{mr}$	$F_c = \frac{2K.E}{r}$
$a_c = \frac{v^2}{r}$	$a_c = r\omega^2$	$a_c = \frac{4\pi^2 r}{T^2}$	$a_c = \frac{P^2}{m^2 r}$	$a_c = \frac{2K.E}{mr}$

Various types of graph for centripetal Acceleration:



Constant quantities

UNIT 03

Under the action of only

centripetal force following quantities remains constant

Speed, kinetic energy, angular speed time period angular momentum. magnitude of velocity and magnitude of linear momentum

Quantities which are zero

Under the action of only centripetal force following quantities remains zero. Work done, change in kinetic energy, tangential acceleration, angular acceleration, tangential force, torque produced by centripetal force, change in angular velocity and change in angular momentum.

Quantities which are changing direction

Under the action of only centripetal force magnitude of following remain constant but their direction changes velocity acceleration. momentum and force.

ORBITAL VELOCITY

Minimum velocity required to put a satellite in a circular orbit is called orbital velocity.

$$\frac{F_c = F_g}{\frac{\text{mv}^2}{r}} = \frac{\text{GMm}}{r^2}$$

$$v = \sqrt{\frac{GM}{r}}$$

Note: $\mathbf{v} \propto \frac{1}{\sqrt{r}}$ and independent of mass of

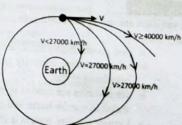
> If satellite is revolving around the earth near its surface then r = R

$$v = \frac{GM}{R} = \sqrt{gR} = 7.9 \text{ km/s}$$

and $T = 5060 sec \approx 84 min$

Minimum height of satellite revolving around the earth is 400 km and 24 such satellites form GPS system.

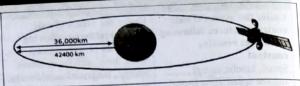
- > If velocity of satellite is less than critical velocity (v < 27000km/h) it will fall towards earth.
- If velocity is equal to critical velocity (v =27000km/h) then it will move in circular path.
- If velocity is greater than critical velocity but less than escape velocity it will move in an elliptical path.
- If velocity is equal or greater than escape velocity it will escape from earth's gravity



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GEOSTATIONARY SATELLITE

"Satellite whose orbital motion is synchronized with the rotation of earth is known as geostationary satellite. And its orbit is known as geostationary orbit".



Orbital speed	Radius of orbit	Height	
$v = \sqrt{\frac{GM}{r}}$ $v = 3.1 km/s$	$r = \left(\frac{GMT^2}{4\pi^2}\right)^{\frac{1}{3}}$	h = r - R	
		h ≈ 36000 km	
	$v = 4.23 \times 10^4 \ km$	veholistication of the	

Time period	Angular velocity	Angular acceleratio
T	$\omega = \frac{2\pi}{T}$	$\alpha = \frac{\Delta \omega}{\Delta t}$
T = 1day = 24h = 86400 sec	$\omega = \frac{1 rev}{day}$ $= \frac{2\pi rad}{day}$	Zero

Such satellites are useful for worldwide communication, weather observation, navigation and military uses.

- > One geostationary satellite can cover 120° longitude of earth.
- > Minimum three correctly positioned satellites are required for complete coverage of
- ➤ Microwaves are used to communicate with geostationary satellites because they travel in narrow beam and pass easily through atmosphere.
- ➤ Largest satellite system is INTELSAT (International Telecommunication Satellite Organization) managed by 126 countries.
- > INTELSAT IV has capacity of 30,000 two way telephone calls plus 3 T.V channels and its operates at 4,6,11 and 14 GHz frequencies.

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UNIT $04 \rangle$

OSCILLATIONS & WAVES

OSCILLATIONS

Periodic Motion:

Motion which repeats itself after regular intervals of time is called periodic motion.

Vibratory Motion:

To and fro motion of a body about its mean position is called vibratory motion.

- Motion of simple pendulum.
- Motion of mass spring system.
- Motion of tuning fork.
- Motion of atoms in solids.



Amplitude:

Maximum displacement covered by body from its mean position is called amplitude.

Vibration:

One complete round trip of a body in motion is called one vibration.

Time period:

Time taken by body to complete one vibration is called time period.

Frequency:

Number of vibrations executed by a body in one second is called frequency.

$$f = \frac{1}{T}$$

Product of time period and frequency is always equal to one

Angular Frequency:

Number of revolutions executed by a body in one second is called angular frequency.

$$\omega = \frac{2\pi}{T}$$

$$\omega = 2\pi f$$

Example: Angular frequency of second pendulum is

(a) $2\pi \, rev \, s^{-1}$

(c) π Hz

- (b) $2\pi Hz$
- (d) $2\pi \, rad \, s^{-1}$

Solution: As time period of simple pendulum is 2sec

$$\omega = \frac{2\pi}{2} = \pi rad \, s^{-1}$$

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No. of vibrations

 $\frac{2}{4}$ vib

₹vib

-vib

1vib

Displacement

Zero

Xo

Zero

Mean to extreme

Mean to extreme

Mean to left

extreme

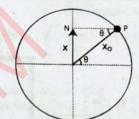
Mean to mean

Instantaneous	dis	placement:
The second secon		

From the figure:

$$sin\theta = \frac{x}{x_o}$$

$$x = x_o \sin\theta$$



Types of Questions:

1. Find displacement when θ is given OR Find $\theta(phase)$ when displacement is given.

Example1:

What is displacement of a body executing SHM when its phase is $\frac{\pi}{r}$ rad.

$$(a)\frac{x_a}{2}$$

$$(b)\frac{x_o}{\sqrt{2}}$$

(a)
$$\frac{x_o}{2}$$
 (b) $\frac{x_o}{\sqrt{2}}$ (a) $\frac{\sqrt{3}x_o}{2}$ (d) x_o

$$(d)x_o$$

$$x = x_o \sin\theta$$

$$x = x_o \sin\frac{\pi}{6} = x_o \sin 30^o$$

$$= \frac{x_o}{2}$$

Example2:

If a body is executing SHM then find the value of θ for which displacement is 70% of maximum displacement. (a)30° (b) 45° (c) 60° (d) 70°

Solution:

$$x = x_o \sin \theta x = 0.7x_o = \frac{x_o}{\sqrt{2}}$$

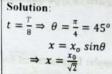
$$\Rightarrow \sin \theta = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \theta = 45^o = \frac{\pi}{4} rad$$

2. Find displacement when time is given OR Find the time when displacement is given.

Example:

What is displacement of body at instant $t = \frac{T}{8}$ where T is time period of the a body executing SHM. (a) 30° (b) 45° (c) 60°



Alternate Solution

$$x = x_o \sin\theta = x_o \sin\omega t = x_o \sin\frac{2\pi}{T} \times \left(\frac{T}{8}\right)$$
$$= x_o \sin\frac{\pi}{4} = x_o \sin45^o$$
$$= \frac{x_o}{\sqrt{2}}$$

SHORT CUT

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SIMPLE HARMONIC MOTION

Simple harmonic motion has following characteristics:

Distance

Xo

 $2x_o$

 $3x_n$

4xo

- Always vibratory motion.
- Acceleration is always directly proportional to displacement.
- Acceleration is always directed towards mean position.



Note

Time taken

3T

4

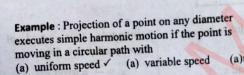
The graph between acceleration and displacement is a straight line in II and IV quadrant.

Examples:

Mass spring system executes SHM. Simple pendulum is executing SHM for small amplitude.

SHM & UNIFORM CIRCULAR MOTION

- Mass spring system executes SHM with amplitude X_o and time period T.
- If point P is moving in circular path with uniform speed or uniform angular velocity then its periodic but not SHM.
- Projection N of the point P is oscillating on vertical axis and is executing SHM.



(a)uniform acceleration

(d) none of these

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TAILURE IN

Example:

The time taken by body executing SHM from its mean position to half of its extreme position.

$$(a) \frac{T}{4}$$

$$(b) \frac{T}{6}$$

(a)
$$\frac{T}{4}$$
 (b) $\frac{T}{6}$ (c) $\frac{T}{8}$

$$(d) \frac{T}{12}$$

$$x = x_0 \sin \theta$$

$$x = \frac{x_0}{2} \Rightarrow \theta = 30^\circ = \frac{\tau}{12}$$

$$\Rightarrow t = \frac{\tau}{12}$$

Alternate Solution:

$$x = \frac{x_o}{2} \Rightarrow x_o \sin\theta = \frac{x_o}{2} \Rightarrow \theta = \frac{\pi}{6}$$

$$\Rightarrow \omega t = \frac{\pi}{6} \Rightarrow \frac{2\pi}{T} t = \frac{\pi}{6} \Rightarrow t = \frac{T}{12}$$

$$t = \frac{T}{12}$$

$$t = \frac{T}{12}$$

$$t = \frac{T}{12}$$

SHORT CUT

Example:

The time taken by body executing SHM from its extreme position to a point midway between mean and extreme position. (a) $\frac{T}{4}$ (b) $\frac{T}{6}$ (c) $\frac{T}{8}$ (d) $\frac{T}{12}$

$$(a) \frac{T}{4}$$

$$\frac{T}{6}$$

$$(c)\frac{T}{8}$$

$$(d) \frac{T}{12}$$

$$x = x_0 \cos \theta$$

$$x = \frac{x_0}{2} \Rightarrow \theta = 60^{\circ} = \frac{\pi}{3}$$

$$\Rightarrow t = \frac{T}{6}$$

Alternate Solution:

$$x = \frac{x_o}{2} \Rightarrow x_o \sin\theta = \frac{x_o}{2} \Rightarrow \theta = \frac{\pi}{6}$$

$$\Rightarrow \omega t = \frac{\pi}{6} \Rightarrow \frac{2\pi}{7} t = \frac{\pi}{6} \Rightarrow t = \frac{T}{12}$$

When motion starts from extreme position then use the relation

$$x = x_o \cos\theta$$

3. Comparison type questions.

$$x = x \sin(\omega t + \phi)$$
Amplitude Angular Initial frequency phase

Example: Displacement for a body executing SHM is given as $x = 10 \sin(4t)$

Find amplitude, maximum velocity, maximum acceleration, angular frequency, time period,

frequency and initial phase.

Compare the equation $x = 10 \sin(4t)$ with standard equation $x = x_0 \sin(\omega t + \phi)$

Amplitude = $x_o = 10$

Maximum velocity = $x_0 \omega = (10)(4) = 40$

Time period = $T = \frac{2\pi}{\alpha} = \frac{\pi}{2}$

Max. acceleration = $x_0 \omega^2 = (10)(4)^2 = 160$

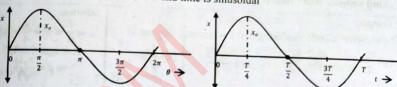
Angular frequency = $\omega = 4$

Initial phase = 0

Frequency = $f = \frac{1}{T} =$

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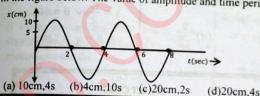
Graph: The graph between x and θ , or x and time is sinusoidal

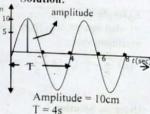


Example:

UNIT 04

Displacement time graph of a body executing SHM is shown x(cm in the figure below. The value of amplitude and time period is

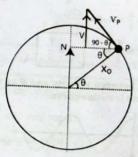




Instantaneous Velocity:

Velocity of point P is always directed along tangent to the circle and ventricle component of its velocity is the velocity of projection which is executing SHM. From the figure:





Types of Questions:

1. Find velocity when θ is given OR find θ when velocity is given.

Example:

What is velocity of the body executing SHM when its phase angle is 30°.

$$(a)\frac{v_o}{2}$$

(b)
$$\frac{v_0}{\sqrt{2}}$$

(b) 45°

$$(c) \frac{v_o \sqrt{v_o}}{2}$$

 $(c) 60^{\circ}$

$$(d) \frac{v_o}{\sqrt{3}}$$

(d) 90°

$v = x_0 \omega \cos \theta$

(a)
$$\frac{v_o}{2}$$
 (b) $\frac{v_o}{\sqrt{2}}$ (c) $\frac{v_o\sqrt{3}}{2}$ (d) $\frac{v_o}{\sqrt{3}}$ $=\frac{x_o\omega\sqrt{3}}{2} = \frac{v_o\sqrt{3}}{2}$

Example:

The value of θ for which velocity of a body executing SHM is (a)30°

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Solution

Solution:

$$v = x_0 \omega \cos\theta$$
$$v = \frac{v_0}{2} \Rightarrow \theta = 60^\circ = \frac{\pi}{3}$$

2. Find velocity when time is given OR find time when velocity is given.

Example:

The velocity of body executing SHM at instant $t = \frac{T}{R} sec$

$$(a)\frac{v_o}{2}$$

(b)
$$\frac{v_o}{\sqrt{2}}$$

$$(c) \frac{v_o \sqrt{3}}{2}$$

$$=\frac{1}{8}\sec^2 d$$

Example:
The velocity of body executing SHM at instant
$$t = \frac{T}{8}sec$$

$$(a) \frac{v_o}{2} \qquad (b) \frac{v_o}{\sqrt{2}} \qquad (c) \frac{v_o\sqrt{3}}{2} \qquad (d) \frac{v_o}{\sqrt{3}}$$

$$\Rightarrow v = \frac{x_o\omega \cos 45^\circ}{\sqrt{2}}$$

Example:

At what instant velocity of a body executing SHM is half of its maximum value.

$$(a) \frac{T}{4}$$

$$(b) \frac{T}{6}$$

$$(c)\frac{T}{8}$$

$$(d) \frac{T}{12}$$

Example:
At what instant velocity of a body executing SHM is half of its naximum value.
(a)
$$\frac{T}{4}$$
 (b) $\frac{T}{6}$ (c) $\frac{T}{8}$ (d) $\frac{T}{12}$ Solution:
 $v = x_0 \omega \cos \theta$
 $v = \frac{v_0}{2} \Rightarrow \theta = 60^\circ$

$$\Rightarrow \theta = \frac{\pi}{3} \Rightarrow t = \frac{T}{6}$$

Alternate Solution

$$v = \frac{v_o}{2} \Rightarrow v_o \cos\theta = \frac{v_o}{2} \Rightarrow \cos\theta = \frac{1}{2}$$
$$\Rightarrow \theta = \frac{\pi}{3} \Rightarrow \omega t = \frac{\pi}{3}$$

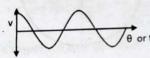
$$\Rightarrow \frac{2\pi}{T}t = \frac{\pi}{3} \Rightarrow \qquad \boxed{t = \frac{T}{6}}$$

SHORT CUT

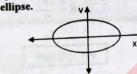
Time _ θ و بلیو معلوم کرنے کیلئے π کی جگد T اور ینچ والی و بلیو کو double کر دی۔

Time _ θ کی و بلیو معلوم کرنے کیلئے T کی جگد π اور ینچے والی و بلیو کو half کر دی۔

Graph between velocity and θ or velocity and time is cosine curve.



Graph between velocity and displacement is an ellipse.



3. Comparison type questions.

$$v = v_{\rho} \cos(\omega t + \phi)$$
Max
Velocity
Angular Initial
frequency phase

Example: velocity a body executing SHM is given as $v = 10 \cos 2t$. Find amplitude, maximum velocity, maximum acceleration, angular frequency, time period, frequency and initial phase. compare the equation $v = 10 \cos 2t$ with the standard equation $v = v_0 \cos \psi + \phi$

Solution: compare the equation :	ii. $\omega = 2$
i. $v_o = 10$	iv. $a_0 = x_0 \omega^2 = 5(2)^2 = 20$
iii. $x_o = \frac{v_o}{\omega} = \frac{10}{2} = 5$	m 1 _ 1
$T = \frac{2\pi}{3} = \frac{2\pi}{3} = \pi$	$vi. T = \frac{1}{f} = \frac{1}{\pi}$

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4. Velocity In terms of displacement:

$$v = \omega \sqrt{x_o^2 - x^2} \qquad = \omega \sqrt{x_o^2 - \frac{x^2 x_o^2}{x_o^2}}$$

$$v = x_o \omega \sqrt{1 - \frac{x^2}{x_o^2}} = v_o \sqrt{1 - \frac{x^2}{x_o^2}}$$

• At mean position
$$x = 0$$

$$\Rightarrow v = x_o \omega (maximum)$$

• At mean position
$$x = x_o$$

 $\Rightarrow v = 0 \ (minimum)$

> Speed of projection increases when it is moving towards center of the circle and its speed decreases when it is moving away from the center of circle

Example:

UNIT 04

If a body is executing SHM then at what displacement velocity is half of its maximum velocity.

$$(a)\frac{v_o}{2}$$

(b)
$$\frac{v_o}{\sqrt{2}}$$

$$(c) \frac{v_o \sqrt{3}}{2} \qquad (d) \frac{v_o}{\sqrt{3}}$$

$$(d) \frac{v_o}{\sqrt{2}}$$

$$v = \omega \sqrt{x_o^2 - x^2} \Rightarrow \frac{x_o \omega}{2} = \omega \sqrt{x_o^2 - x^2}$$

$$\Rightarrow \frac{x_o}{2} = \sqrt{x_o^2 - x^2} \Rightarrow \frac{x_o^2}{4} = (x_o^2 - x^2)$$

$$\Rightarrow x^2 = x_o^2 - \frac{x_o^2}{4} \Rightarrow x^2 = \frac{3x_o^2}{4}$$

$$x = \frac{\sqrt{3}x_o}{2}$$

Alternate short cut solution:

displacement = Velocity و displacement حدود ذیل کو آپس میں بدل ویں۔

As
$$v = \frac{v_0}{2}$$

Replace
$$v_o$$
 by x_o and vice versa.

Replace
$$\frac{1}{2}$$
 by $\frac{\sqrt{3}}{2}$ and vice versa.

Replace
$$\frac{1}{\sqrt{2}}$$
 by $\frac{1}{\sqrt{2}}$

Instantaneous Acceleration:

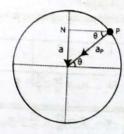
- Since point P is moving in circular path with uniform speed hence it only posses centripetal acceleration directed towards the center of the circle.
- Its vertical component is acceleration of projection N executing SHM.From the figure:

$$\sin\theta = \frac{a}{a_p}$$
 or $a = a_p$



$$\vec{a} = -\omega^2 \vec{x}$$

$$a = x_0 \omega^2 \sin \omega t$$



AIDCAT PREP BOOK



1. Find acceleration when θ is given OR find θ when acceleration is given.

Example:

Acceleration of a body executing SHM at angle 30° is (a) $\frac{\sqrt{3}a_o}{2}$ (b) $\frac{a_o}{\sqrt{2}}$ (c) $\frac{a_o}{2}$

$$(a)\frac{\sqrt{3}a_o}{2}$$

$$\frac{a_o}{\sqrt{2}}$$

$$(d) a$$

Solution:

$$a = x_0 \omega^2 \sin 30^\circ$$

$$a = \frac{x_0 \omega^2}{2} = \frac{a_0}{2}$$

Example:

For which of θ acceleration of a body executing SHM is $\frac{x_0\omega^2}{\sqrt{2}}$

For which of
$$\theta$$
 acceleration of a body executing STATES (a)30° (b) 45° (c) 60° (d) 90°

2. Find time when acceleration is given and vice versa. Example:

Acceleration of a body executing SHM at instant
$$t = \frac{T}{6}$$
 is
$$\sqrt{3}a_0 \qquad (b) \frac{a_0}{a_0} \qquad (c) \frac{a_0}{2} \qquad (d) a_0$$

$$\frac{a_o}{\sqrt{2}}$$

$$(c)\,\frac{a_o}{2}$$

Acceleration of a body executing of the distribution
$$\frac{a_0}{2}$$
 (a) $\frac{\sqrt{3}a_0}{2}$ (b) $\frac{a_0}{\sqrt{2}}$ (c) $\frac{a_0}{2}$ (d) a_0

$$a = x_0 \omega^2 \sin \theta$$

$$a = \frac{x_0 \omega^2}{\sqrt{2}} \Rightarrow \theta = 45^\circ$$

t =
$$\frac{T}{6}$$
 $\Rightarrow \theta = \frac{\pi}{3} = 60^{\circ}$
 $a = x_0 \omega^2 \sin \theta$
 $\Rightarrow a = \frac{x_0 \omega^2 \sqrt{3}}{2} = \frac{a_0 \sqrt{3}}{2}$

At what instant the acceleration of the body is $\frac{x_0\omega^2}{2}$ or $\frac{a_0}{2}$ $(a) \frac{T}{4} \qquad (b) \frac{T}{6} \qquad (c) \frac{T}{8} \qquad (d) \frac{T}{12}$ $3 a = \frac{a_0}{2} \Rightarrow \theta = 30^{\circ}$ $= \frac{\pi}{6} \Rightarrow t = \frac{T}{12}$

$$(a)\frac{T}{4}$$

$$(b)\ \frac{T}{6}$$

$$(c)\frac{T}{8}$$

$$(d) \frac{T}{12}$$

Solution:
$$a = x_0 \omega^2 \sin \theta$$

$$=\frac{2}{6} \Rightarrow t = \frac{T}{12}$$

3. Comparison type questions:

$$a = a_{o} \sin (\omega t + \phi)$$
Max. Angular acceleration frequency phase

Example: acceleration of a body executing SHM is given as $a = 8 \sin 2t$. Find amplitude, maximum velocity, maximum acceleration, angular frequency, time period, frequency and initial phase.

Compare the equation $a = 8 \sin 2t$ with the standard equation $a = a_0 \sin(\omega t + \phi)$

i. $a_0 = 8$	ii. $\omega = 2$
iii. $v_o = \frac{a_o}{\omega} = \frac{8}{2} = 4$	iv. $x_o = \frac{a_o}{\omega^2} = \frac{8}{4} = 2$
$V. T = \frac{2\pi}{\omega} = \frac{2\pi}{2} = \pi$	$vi. T = \frac{1}{l} = \frac{1}{\pi}$



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PHASE

Angle of θ which specifies the displacement as well as direction of motion of a body executing SHM is called phase.

- o Initial phase at $t = 0 = \emptyset$
- phase during the time $t = \omega t$
- Total phase = $\omega t + \emptyset$

	1/4	1
	- 12	Ø
		1
1		/

Motion starts t = 0 from	Initial phase	Displacement	Velocity	Acceleration
	Ø	$x = x_o \sin(\omega t + \emptyset)$	$v = x_o \omega \cos(\omega t + \emptyset)$	$a = -x_o \omega^2 \sin(\omega t + \emptyset)$
Mean position	Ø = 0	$x = x_o sin\omega t$	$v = x_o \omega cos \omega t$	$a = -x_o \omega^2 \sin \omega t$
Extreme position	Ø = 90°	$x = x_o cos \omega t$	$x = -x_o sin\omega t$	$a = -x_o \omega^2 \cos \omega t$

UNIT 04

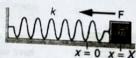
- Phase difference between displacement and velocity is 90°.
- Phase difference between velocity and acceleration is 90°.
- Phase difference between displacement and acceleration is 180°.



MASS SPRING SYSTEM

- Mass spring system executes simple harmonic motion.
- Restoring force brings the body back towards mean position.
- Body does not come to rest at mean position due to inertia.







Hooke's Law: Applied force is directly proportional to extension produced in spring.

 $F \propto x$

- > The graph between force and extension is a straight
- Slope of the graph represents the spring constant. Area under force-extension graph represents the work done or P.E.



ال جر كراف spring constant لادع الكل islope في الدوية ドルシシwork done LP.ECいしまれい」iArea きというしゃ .2

AIDCAT PREP BOO



 $K = slope = Tan\theta$

 $\frac{K_1}{K_2} = \frac{Tan30^\circ}{Tan60^\circ}$

 $(W_1 > W_2)$

 $K = \frac{F}{x} = \frac{30N}{15cm}$

 $=\frac{30N}{15\times10^{-2}m}=200\ Nm^{-1}$

W = Area

 $=\frac{1}{2}(15\times10^{-2})(30)=2.25$ J

Example:

Force-extension graph for two different springs is shown in the figure below. Find the ratio between their spring constants.



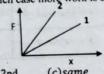
 $(a)1:\sqrt{3}$

 $(b)\sqrt{3}:1$

(d)3:1

Example:

Force-extension graph for two different springs is shown in the figure below. In which case more work is done.



(a) 1st

(b) 2nd

(c)same

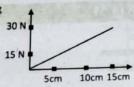
(d) zero in both

Solution:

Solution:

Solution:

Example: Force-extension graph for a spring is shown in the figure below. The value of spring constant and P.E stored in the spring



Spring Constant or Force constant

Ratio of applied force to extension produced in spring is known as spring constant.

$$K = \frac{F_{ext}}{x}$$

$$\Rightarrow \text{ SI unit} = Nm^{-1} = kgms^{-2}$$

 Spring constant and surface tension have same units.

Spring constant depends upon temperature and nature of the material.

Spring constant is independent of applied force and extension produced in spring.

Example: A mass of 5kg suspended with a vertical spring produces 2cm extension in the spring. The spring constant of the spring will be

(a) 500 Nm⁻¹

(b) 5000 Nm⁻¹ (c) 2500 Nm⁻¹ (d)250Nm⁻¹

Solution:

$$k = \frac{F}{x}$$

$$= \frac{mg}{x} = \frac{5 \times 10}{2 \times 10^{-2}} = 2500 \text{ Nm}^{-1}$$

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Series Combination of Springs

If springs are connected end to end this combination is known as series combination

Equivalent Spring Constant

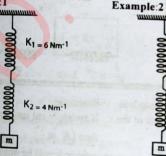
$$1. K_{eq} = \frac{K}{n}$$

UNIT 04

2.
$$K_{eq} = \frac{K_1 K_2}{K_1 + K_2} = \frac{Product}{sum}$$

3.
$$\frac{1}{\kappa_{eq}} = \frac{1}{\kappa_1} + \frac{1}{\kappa_2} + \frac{1}{\kappa_3} + \cdots$$





NOTE:

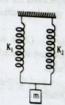
Equivalent spring constant series is less than minimum spring constant And to decrease the spring

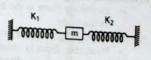
constant springs are connected in series

Parallel Combination of Springs

If springs are connected side by side then this combination is known as parallel combination

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パカスト

Equivalent Spring Constant

If springs are connected side by side then equivalent spring constant is given as:

- (If "n" no. of springs having same value are connected in parallel)
- 2. $K_{eq} = K_1 + K_2 + \cdots$ (If springs having different values are connected in parallel)
- 3. $K_{eq} = K_{max}$
- 4. To increase spring constant springs are connected in parallel.

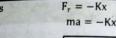
MDCAT PREP BOOK



Example1:

Example2:

Acceleration:





$$\max.acceleration = -\frac{K}{m}x$$

$$\Rightarrow a \propto -x$$

Hence mass spring system is executing simple harmonic motion.

Time Period:

As $T = \frac{2\pi}{3}$

 $T \alpha \sqrt{m}$ and $T \alpha \frac{1}{\sqrt{n}}$

Note: Time period only depends upon spring

constant and mass suspended and

independent of amplitude and gravity.

Angular Frequency:

As
$$a = -\frac{\kappa}{m}x$$

 $-\omega^2 x = -\frac{K}{m}x(\because a = -\omega^2 x)$

$$\omega = \sqrt{\frac{K}{m}}$$

Note:

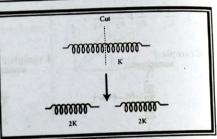
Angular frequency only depends upon spring constant and mass suspended and independent of amplitude and gravity.

Frequency:

If a spring of spring constant K is cut into 'n' equal parts then spring constant of each part will be 'nK'

Example:

If spring of spring constant K is cut into two equal parts then spring constant of each part will be 2K.



Examples: If spring is cut into two parts having length in the ratio 1:2 then the ratio between spring constants of the part will be.

- a) 1:2
- √b) 2:1
- c) 1:4
- d) 4:1

Solution:

Example3:

K = 5 N/m

If spring is cut into unequal parts then $\left(K \propto \frac{1}{L}\right)$ ratio in k will be opposite to l

Restoring Force:

Force which brings the body back towards its mean position.

- > Restoring force is the force which produces acceleration
- $F_r = -F_{ext} = -Kx = -m\omega^2 x \quad (K = m\omega^2)$
- > Restoring force is always directed towards mean position and is opposite to displacement.
- > Graph between restoring force and displacement is a straight line in 2nd and 4th Quadrant.



Zavan Publishe

K = 5 N/m

Example: The graph between restoring force and displacement is shown in the figure . Slope of the graph is directly proportional to

- (a) w (b) 1/w
- (d) $1/\omega^2$

As $F_r = -m\omega^2 x$

$$slope = \frac{F_r}{x} = -m\omega$$
$$slope \propto \omega^2$$



and $f \propto \frac{1}{\sqrt{m}}$

Note: Frequency only depends upon spring constant and mass suspended and independent of amplitude and gravity.

If spring is being vertically then we may write F = mg

$$\Rightarrow Kx = mg \Rightarrow \frac{m}{K} = \frac{x}{g}$$

$$T = 2\pi \sqrt{\frac{x}{g}} \text{ and } f = \frac{1}{2\pi} \sqrt{\frac{g}{x}}$$

Since now $x \propto g$ hence time period and frequency are still independent of gravity.

Example: If a 2kg mass suspended with a vertical spring produces 10cm extension in the spring. If it is set into oscillations its time

- (a) w (b) 1/w
- (b) ω2
- (d) $1/\omega^2$

Solution: $T = 2\pi \sqrt{\frac{x}{g}}$

ADCAT PREP BOOK

Velocity:

 $v = \omega \sqrt{x_o^2 - x^2} = \sqrt{\frac{k}{m}} \sqrt{x_o^2 - x^2}$

 $= \sqrt{\frac{k}{m}(x_0^2 - x^2)} = \sqrt{\frac{k}{m}}x_0 \sqrt{1 - \frac{x^2}{x_0^2}}$

max.velocity $v_0 = x_0 \omega = x_0 \left| \frac{k}{m} \right|$

Restoring Force:

UNIT 04

The component $mgsin\theta$ brings the body back towards its mean position

$$F_r = -mgsin\theta$$

- > -ve sign indicates that it is directed towards the mean position.
- > Torque acting on pendulum is mglsino

 \triangleright If angle θ is very small $\Rightarrow \sin\theta \approx \theta \approx \frac{x}{e}$ $\left(\because \theta = \frac{s}{r}\right)$

 $a \propto -x$

small angular displacement $'\theta'$.

Simple pendulum executes SHM for

Acceleration

 $ma = -mgsin\theta$ $a = -gsin\theta$

If pendulum makes an angle θ with the horizontal instead of vertical then

Tension in string is

$$T = mgcos\theta$$

Restoring force is

$$F_r = -mgcos\theta$$

SIMPLE PENDULUM

Simple pendulum consists of small heavy mass suspended with a light and intensible string whose other end is fixed with rigid support.

- ℓ = length of pendulum
- θ = Angular displacement with vertical axis
- s = distance from mean position
- x = displacement from mean position

Displacement:

 $x = x_0 \sin \omega t$

 $\Rightarrow x = x_o \sin \left| \frac{K}{m} t \right|$

 $max.displacement = x_0$

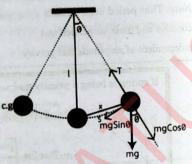
Instantaneous displacement for mass

spring system is given as

mg = weight

 $mgcos\theta$ = component along the string

 $mgsin\theta$ = component perpendicular to the string



Tension in String:

Since no acceleration is produced along the string hence net force along the string is zero.

$$T - mgcos\theta = 0$$

$$T = mgcos\theta$$

- At mean position ($\theta = 0$) tension is maximum and equal to weight $T = mg\cos = mg$
- \triangleright At extreme position ($\theta = maximum$) Tension is maximum.
- ▶ If angular displacement θ is very small then $\cos\theta \approx 1$ and $T \approx \text{mg} \approx \text{constant}$.

Angular Frequency:

$$a = -g\frac{x}{\ell}$$
$$-\omega^2 x = \frac{g}{\ell} x \Rightarrow \omega^2 = \frac{g}{\ell}$$

$$\omega = \sqrt{\frac{g}{\ell}}$$

$$\omega \propto \sqrt{g}$$
 and $\omega \propto \frac{1}{\sqrt{\ell}}$

Note:

- (i) Angular frequency only depends upon length of pendulum and acceleration due to gravity.
- (ii) It is independent of amplitude and mass of the bob.

Time Period

OR



 $\Rightarrow T \propto \sqrt{\ell}$ and $T \propto \frac{1}{\sqrt{n}}$

- T only depends upon length and acceleration due to gravity.
- T is independent of amplitude and mass of the body.

Frequency:

 $T \propto \sqrt{g}$

Note:

- Frequency only depends upon length and acceleration due to gravity.
- Frequency is independent of amplitude and mass of the body.

OCAT PREP BOOK

Second Pendulum:

A pendulum whose time period is two seconds is called second pendulum. $f = 0.5 \, Hz$, $\ell = 99.3 \, cm$ (when $a = 9.8 ms^{-2}$)

Example1: If time period of second pendulum on surface | Solution: Two second of earth is two seconds. Then time period of second pendulum on surface of moon will be

(a) 2sec

(b) $2\sqrt{6}$ sec (c) $2/\sqrt{6}$ sec (d) infinity

Example2:

If time period of second pendulum on earth is two seconds and it is shifted to moon then its time period will (value of $g_{moon} = \frac{g_{eart h}}{6}$)

(a) 2sec (b) $2\sqrt{6}$ sec (c) $2/\sqrt{6}$ sec (d)infinity

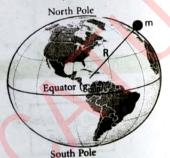
As $g' = \frac{g}{6} \Rightarrow T' = \sqrt{6}T = 2\sqrt{6}s$

اگر pendulum کو کسی ایسی جگه shift کیا جائے جہاں 'g' کی دیلیو مختلف ہو تو اس pendulum کا ٹائم پریڈ بحی change وائے گا

VARIATION IN VALUE OF 'g'

On surface of earth

- > Expression for 'g' on the surface of earth is
- > At poles value of g is maximum due to shorter distance from center of earth and value of g is independent of rotation of earth.
- \triangleright At equator value of g is maximum due to longer distance from center of earth and due to rotation of earth. (value of g varies inversely with rotation of earth. If angular velocity of earth increases value of g decreases and vice versa).
- > By moving from poles to equator value of 'g'
- > By moving from equator to pole value of 'g'



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كى مجل ملك second pendulum كى يديو يحاجات وود

-8 ×2 sec ≥5

 $T = 2\pi \sqrt{\frac{\ell}{g}} \implies T \alpha \frac{1}{\sqrt{g}}$

4. In an accelerating frame of reference

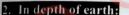
- If it is moving upward with acceleration 'a' then g' = g + a (g increases).
- If it is moving in horizontal direction with acceleration a then



	h	
1	1	
	1	9

	h	
1		
1	1	
	The state of the s	

S. Carlotte				
Height	$h=\frac{R}{2}$	h = R	h = 2R	h = 3R
g	$g' = \frac{4g}{9}$	$g' = \frac{g}{4}$	$g' = \frac{g}{g}$	$g' = \frac{g}{16}$



UNIT 04

> At depth 'd' value of 'g' is given as

1. Above the surface of earth:

 $g' = \frac{GM}{(R+h)^2}$

> At height h value of 'g' is given as

> By increasing the height value of 'g'

gkarachi > gmurree > g(K-2)

$$g' = \frac{GM(R-d)}{R^3}$$

> By increasing depth value of 'g' decreases.

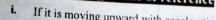
Example: If
$$d = \frac{R}{2}$$

$$g' = \frac{GM\left(R - \frac{R}{2}\right)}{R^3}$$
$$= \frac{GM\left(\frac{R}{2}\right)}{R^3} = \frac{GM}{2R^2} = \frac{g}{2}$$



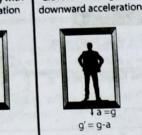


- At center of the planets.
- At infinite distance from the planet.
- Inside satellites revolving around the earth.
- iv. Inside a freely falling system.
- (At these places time period of pendulum is infinity and frequency will be zero)



- If it is moving downward with acceleration 'a' then g' = g a (g decreases). If it is at rest or moving with uniform velocity (a = 0) then g' = g.
- - $g' = \sqrt{g^2 + a^2}(g \text{ increases})$





Elevator moving with



ENERGY CONVERSION IN SHM

> If a body is executing SHM then P.E and K.E interchanges into each other but total amount of energy always remains constant.

Work done:

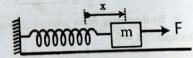
- > In stretching the spring work is done by variable force.
- > Expressions for work done.

i.
$$W = \frac{1}{2}Fx$$

ii.
$$W = \frac{1}{2}kx^2$$

iii.
$$W = \frac{F^2}{2k}$$

iii.
$$W = \frac{F^2}{2k}$$



Questions مِن وَى كُنّ information كُود يَجَعَ بوع Questions -1 Sdecide

Example1:

If two different springs are subjected to same amount of force and the ratio between their extensions is 1:2 then the ratio between the work done will be.

- (a) 1:2
- (b) 2:1
- (c) 1:4
- (d) 4:1

Solution:

 $W \propto x \quad (F = constant)$ So ratio between work is 1:2

Example 2:

To produce 2cm extension in the spring 5J work is done on it. How much work is required to produce 4cm extension? (b) 10J (c) 20J (d) 40J

- (a) 5J

Solution:

$$W = \frac{1}{2}kx^2 \implies$$

$$W \propto x^2 \ (k = constant)$$
Since extension is doubled so work becomes 4 times $W = 4(5) = 20$

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Example3:

If 2N force is applied on a spring having spring constant 10Nm⁻¹ then work done is equal to.

- (a) 1:2
- (b) 2:1
- (c) 1:4

Solution:

$$W = \frac{F^2}{2k} = \frac{(2)^2}{2 \times 10}$$

$$= \frac{2}{10} = 0.2$$

Potential Energy:

> Since elastic force is conservative force so work done is equal to gain in P.E.

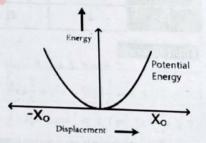
$$P.E = \frac{1}{2}Fx, \ P.E = \frac{1}{2}kx^2, \ P.E = \frac{F^2}{2k}$$

 \triangleright At mean position x = 0

$$P.E = 0 (minimum)$$

 \triangleright At extreme position $x = x_0$

$$P.E = \frac{1}{2}kx_o^2 \ (maximum)$$



Displacement	x = 0	$\frac{x_o}{2}$	$\frac{x_o}{\sqrt{2}}$	$\frac{\sqrt{3}x_o}{}$	x _o
P.E	0	$\frac{E_o}{A} = 25\%$	$\frac{E_o}{2} = 50\%$	3E ₀ - 750/	$E_o = 100\%$

Note:

P.E of horizontal mass-spring system is independent of mass of the body.

Kinetic Energy:

As
$$K.E = \frac{1}{2}mv^2$$

and
$$v = \sqrt{\frac{k}{m}} \sqrt{x_o^2 - x_o^2}$$

$$\Rightarrow K.E = \frac{1}{2}k(x_o^2 - x^2) \quad o$$

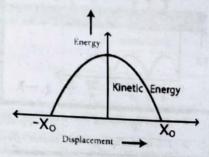
As
$$K.E = \frac{1}{2}mv^2$$
 and $v = \sqrt{\frac{k}{m}}\sqrt{x_o^2 - x}$
 $\Rightarrow K.E = \frac{1}{2}k(x_o^2 - x^2)$ or
 $K.E = \frac{1}{2}m\omega^2(x_o^2 - x^2)(\because k = m\omega^2)$
 \Rightarrow K.E depends upon spring and the second states are

- K.E depends upon spring constant amplitude and displacement.
- K.E is independent of mass of the body.
- At mean position $x = 0 \Rightarrow$

$$K.E = \frac{1}{2}kx_0^2 \ (maximum)$$

At extreme position $x = x_o \Rightarrow$ K.E = 0 (minimum)





AMDCAT PREP BOOK

UNIT 04	9	OSCILLATIONS	S & WAVES		ayan Publisher
Displacement	x = 0	$x = \frac{x_o}{2}$	$x = \frac{x_o}{\sqrt{2}}$	$x = \frac{\sqrt{3}x_o}{2}$	x _o
P.E	0	$\frac{E_o}{4} = 25\%$	$\frac{E_o}{2} = 50\%$	$\frac{3E_o}{4} = 75\%$	$E_o = 100\%$
K.E	$E_o = 100\%$	$\frac{3E_o}{4} = 75\%$	$\frac{E_o}{2} = 50\%$	$\frac{E_o}{4} = 25\%$	0
T.E	E _o	E _o	Eo	Eo	Eo

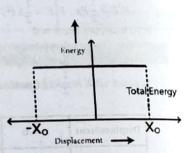
Total Energy:

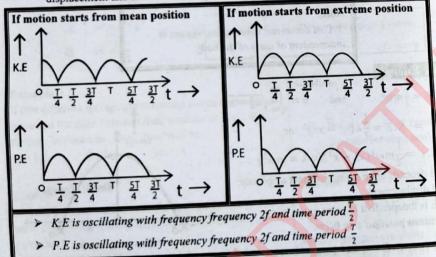
$$T.E = K.E + P.E$$

$$T.E = \frac{1}{2}k(x_o^2 - x^2) + \frac{1}{2}kx^2$$

$$T.E = \frac{1}{2}kx_0^2 \text{ or } T.E = \frac{1}{2}km\omega^2x_0^2(\because k = m\omega^2)$$

- T.E only depends upon spring constant and amplitude.
- > T.E is directly proportional to square of amplitude $(T.E \alpha x_o^2)$
- T.E of mass spring system is independent of displacement and mass of the body.





By AZHAR IQBAL 0336-7098894

UNIT 04 OSCILLATIONS & WAVES

Example:

At what displacement P.E and K.E of a body executing SHM are equal.

$$(a)\frac{x}{2}$$

$$(b)\frac{x_o}{\sqrt{2}}$$

$$\frac{\sqrt{3}x_o}{2}$$
 (d)x

Solution: P. E = K. E

$$\frac{1}{2}kx^2 = \frac{1}{2}k(x_o^2 - x^2)$$

$$x^2 = x_0^2 - x^2$$
$$2x^2 = x^2$$

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$$2x^2 = x_o^2$$
$$x = \frac{x_o}{\sqrt{2}}$$

Quick Revision Chart:

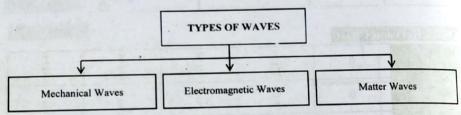
t	0	<u>T</u>	$\frac{T}{8}$	$\frac{T}{6}$	$\frac{T}{A}$
θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
x	0	$x = \frac{x_o}{2}$	$x = \frac{x_o}{\sqrt{2}}$	$x = \frac{\sqrt{3}x_o}{2}$	x ₀
V	$v_0 = x_0 \omega$	$\frac{\sqrt{3}v_o}{2}$	$\frac{v_o}{\sqrt{2}}$	$\frac{v_o}{2}$	0
A	0 .	$\frac{a_0}{2}$	$\frac{a_o}{\sqrt{2}}$	$\frac{\sqrt{3}a_o}{2}$	$a_0 = x_0 \omega^2$
P.E	0	$\frac{E_o}{4}$	$\frac{E_o}{2}$	$\frac{3E_o}{4}$	$E_o = \frac{1}{2}kx_o^2$
K.E	0	$\frac{3E_o}{4}$	$\frac{E_o}{2}$	$\frac{E_o}{4}$	0

Quantity	At mean Position	4.5
Displacement	The state of the s	At Extreme Position
Velocity	0	x _o (maximum)
Contract Con	$x_o \omega$ (maximum)	0
Acceleration	0	v 432 (maxi
Force	0	$x_o \omega^2$ (maximum)
Momentum		$kx_o = mx_o\omega^2$ (maximum
	$mx_o\omega$ (maximum)	0
P.E	0	$\frac{1}{2}kx_o^2 \ (maximum)$
K.E	$\frac{1}{2}kx_0^2$ (maximum)	2 0 ()

SMDCAT PREP BOOK

WAVES

- > Wave is disturbance in a medium which transfers energy and momentum from one region of space to another.
- Wave do not transfers matter.

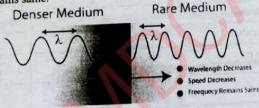


Mechanical Waves:

- > They require medium for their propagation.
- > They are produced by vibrating matter particles.
- > Water waves, waves in spring, waves in string, sound waves, ultrasound waves and infrasound waves are mechanical waves.
- > In vacuum speed of mechanical waves is zero.
- > When enter from rare to denser medium their speed and wavelength both increases but frequency remains same.

Denser Medium Rare Medium

When enter from denser to rare medium their speed and wavelength both decreases but frequency remains same.



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UNIT 04

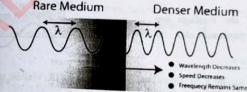
OSCILLATIONS & WAVES

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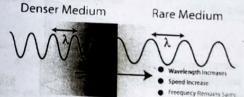
Wave:	Electromagnetic Waves:
Sound waves	20Hz—20000Hz
Infrasound	Less than 20Hz
Ultrasound	Greater than 20000Hz

Electromagnetic Waves:

- > They do not require medium for their propagation.
- ➤ Vibrating electric and magnetic field in perpendicular direction.
- Radio waves, micro waves, infrared, visible light, ultraviolet, x-rays and γ -rays are electromagnetic waves.
- Spectrum
- > Visible light spectrum.
- ▶ In vacuum all electromagnetic waves have same speed = $3 \times 10^8 \ m/s$.
- Relation between wavelength and frequency is $f \propto \frac{1}{3}$.
- When enter from rare to denser medium their speed and wavelength both decreases but frequency remains same.



When enter from denser to rare medium their speed and wavelength both increases but frequency remains same.



In medium val

Example:

Which of following radiation will travel faster in glass

(C) Ultraviolet

(B) Visible light

(D) All have same speed

Answer: Infrared Reason:

Infrared greater wavelength than others so

v x l.

DCALPRIP BOO

Matter Waves:

- Waves associated with moving particles.
- > Matter waves were proposed by De-Broglie.
- For example De-Broglie wavelength of a particle is given as

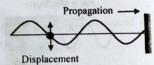
In terms of speed	In terms of momentum	In terms of energy	In terms of accelerating voltage
$\lambda = \frac{h}{mv}$	$\lambda = \frac{h}{p}$	$\lambda = \frac{h}{\sqrt{2mE}}$	$\lambda = \frac{h}{\sqrt{2meV}}$
$\lambda \propto \frac{1}{m}$ and $\lambda \propto \frac{1}{v}$	$\lambda \propto \frac{1}{p}$	$\lambda \propto \frac{1}{\sqrt{E}}$	$\lambda \propto \frac{1}{\sqrt{V}}$

PROGRESSIVE OR TRAVELLING WAVES

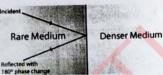
- > Waves which transfer energy by moving away from source of disturbance are called progressive waves.
- > Transverse and longitudinal waves are two types of progressive waves.

Transverse Waves:

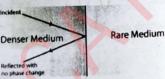
Waves in which particles of the medium are displaced in a direction perpendicular to direction of propagation.



- Water waves, waves in string and all E.M waves (radio, microwaves, IR, visible, ultraviolet, xrays, γ-rays) are transverse waves
 - > When a transverse wave travelling in rare medium is reflected from denser medium it undergo a phase change of 180°.



> When a transverse wave travelling in denser medium is reflected from rare medium no phase change occurs.

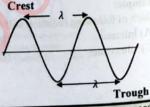


Crest:

Portion of wave in which particles are displaced above their mean position.

Trough:

Portion of wave in which particles are displaced below their mean position.



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Wavelength:

UNIT 04

Distance between two consecutive crests or troughs is called wavelength.

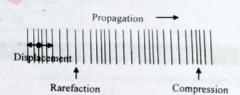
- > Transverse waves can be polarized.
- > Transverse waves can be set up only in solids, in liquids and gases they are damped out quickly.

OSCILLATIONS & WAVES

Longitudinal Waves:

Waves in which particles of the medium are displaced in a direction along the direction of propagation of waves.

Sound waves, ultrasound waves, infrasound waves and waves in spring are examples of longitudinal waves.

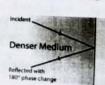


- > Compression: Portion of the wave in which density of particles is high.
- > Rarefaction: Portion of the wave in which density of particles is low.
 - > When longitudinal waves travelling in rare medium is reflected from denser medium, no phase change occurs.



Denser Medium

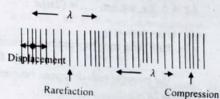
When longitudinal wave travelling in denser medium is reflected from rare medium it undergoes a phase change of 180°.



Rare Medium

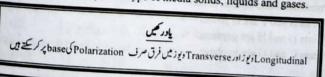
Wavelength:

Distance between consecutive compressions two consecutive rarefactions is called wavelength.



Longitudinal waves can not be polarized.

Longitudinal waves can be set up in all type of media solids, liquids and gases.



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OSCILLATIONS & WAVES

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PERIODIC WAVES:

Continuous, regular and rhythmic disturbances in a medium are called periodic waves.

 \triangleright Relation $v = f\lambda$ is only applicable for periodic waves.

Speed: Distance covered by wave in one second.

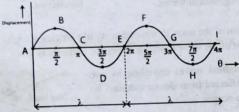
Wavelength: Distance between two consecutive points which are in phase.

Frequency: Number of waves passing through a point in one second.

$$f = \frac{number\ of\ waves}{time}$$

PHASE RELATIONSHIP BETWEEN TWO POINTS ON

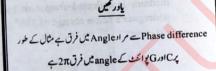
Consider a waveform shown in figure below



In phase:

- · Points having same displacements as well as same direction of motion are called in phase points.
- · Phase difference between two in phase points is even π

 $\Delta \emptyset = 0, 2\pi, 4\pi, 6\pi, \ldots = (2n)\pi$



> Path difference between two in phase points is integral multiple of λ

$$\Delta x = 0, \lambda, 2\lambda, 3\lambda, \dots = n\lambda$$

For example path difference between A and E is λ and path difference between A and I is 2\lambda

Examples:

- Points A, E and I are in phase.
- Points B and F are in phase.
- Points D and H are in phase.
- Points C and G are in phase.

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Out of phase:

UNIT 04

- > Points having opposite displacement or opposite direction of motion are called out of phase points.
- > Phase difference between two out of phase points is odd π

$$\Delta\emptyset=0,2\pi,4\pi,6\pi,\ldots=(2n+1)\pi$$

Example: Phase difference between B and D = $\frac{3\pi}{2} - \frac{\pi}{2} = \pi$

> Path difference between two out of phase points is integral multiple of $\frac{\lambda}{2}$

$$\Delta x = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}, \dots = (2n+1)\frac{\lambda}{2}$$

For example path difference between A and $C = \frac{\lambda}{2}$.

Examples:

- > Points A and C are out of phase.
- Points B and D are out of phase.

Relation between phase difference and path difference is given as

$$\Delta \emptyset = \frac{2\pi(\Delta x)}{\lambda}.$$

اگر \D افران علی علوم کوئی ایک معلوم ہو تو تو اس فار مولے ہے دوسرے کو معلوم کریں۔

Example:

Path difference between two points is $\frac{3\lambda}{4}$ then the points are:

- (a) In phase (c) Coherent
- (b) Out of Phase
- (d) Neither in phase nor out of phase

neither in phase nor out of phase Because Path difference is neither

multiple of λ nor $\frac{\lambda}{2}$.

SPEED OF SOUND

- Sound waves (pressure waves) are longitudinal waves.
- In vaccum (free space) speed of sound is
- In any medium speed of sound is given as

$$v = \sqrt{\frac{E}{\rho}}$$

- Speed of sound only depends upon two factors Modulus of elasticity of the medium
 - or compressibility of medium.

or compressibility of medium.

$$v \propto \sqrt{E}$$
 or $v \propto \frac{1}{\sqrt{compressibility}}$
 $(\because E = \frac{1}{compressibility})$

ii. Density or inertia of the continuous formula of the continu

- ii. Density or inertia of the medium.
- Speed of sound is independent of frequency, wavelength or loudness.

In solids molecules are closely spaced to each other as compared to liquids and gases that is why they respond to the disturbance more quickly as

Example:

 $E_s > E_{liq} > E_g$ So $v_s > v_{liq} > v_g$

Which of the following sound waves have greater speed in air (a) 20 Hz

(b) 10,000 Hz

(c) 20,000 Hz

(d) All have same /

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SPEED OF SOUND IN AIR

Newton's Calculations:

For calculating speed of sound in air Newton assumed that when sound waves passes through air temperature of air remains constant (isothermal process).

- > Boyle's law is applicable (PV = constant).
- > According to Newton or for isothermal process, modulus of elasticity of air is equal to pressure of air $(E = P = 1.01 \times 10^5 \text{ pa})$
- > According to Newton speed of sound in air is

$$v = \sqrt{\frac{P}{\rho}}$$
 (: E = P)
$$v = \sqrt{\frac{1.01 \times 10^5}{1.29}} = 280 \text{ m/s}$$

- > Experimental value of speed of sound in air at standard temperature (0°C) is 332 m/s.
- > There was about 16% error in Newton's calculations.

Laplace Correction:

- > Laplace pointed out that compressions and rarefactions occurs so rapidly that heat produced during the compressions is confined to the region where it is generated and does not have time to flow to the cooler region where rarefaction occurs.
- > Temperature of air does not remain constant.
- > Since no heat flow occurs so passage of sound is an adiabatic process.
- \triangleright Relation between pressure and volume is $PV^{\gamma} = constant$.
- \triangleright γ has no unit, no dimensions and $\gamma > 1$.

Monoatomic gas	Diatomic gas	Polyatomic ga
AND DESCRIPTION OF PERSONS ASSESSED.	y = 1.4	y = 1.29
$\gamma = 1.67$		

- As air is almost diatomic so for air $\gamma = 1.4$.
- According to Laplace or for adiabatic process, modulus of elasticity of air is γ times pressure of air $(E = \gamma p)$
- According to Laplace, speed of sound in air is

$$v = \sqrt{\frac{\gamma P}{\rho}}$$

$$v = \frac{1.4 \times 1.01 \times 10^5}{1.29} \approx 333 \text{ m/s}$$

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Example:

If v1 and v2 are speeds of sound in air according to Newton and Laplace calculations then which of the following is true.

(a)
$$v_1 = v_2$$
 (b) $v_1 = \sqrt{\gamma} v_2$ (c) $v_2 = \sqrt{\gamma} v_1$ (d) $v_2 = \gamma v_1$

$$(\mathbf{c})v_2 = \sqrt{\gamma}v_1$$

(d)
$$v_2 = \gamma v$$

$$\frac{v_1}{v_2} = \frac{\sqrt{\rho}}{\sqrt{\frac{\gamma P}{\rho}}} = \frac{1}{\sqrt{\rho}}$$

Solution:

$$\sqrt{\rho}$$
 $\Rightarrow v_2 = \sqrt{\gamma}v_1$

Effect of Pressure:

Since density is directly proportional the pressure $\left(\frac{P}{\rho} = constant\right)$ hence speed of sound is not effected by variation in pressure of air.

> Graph between speed of sound in air verses pressure is straight line



Example: If pressure of air is doubled then speed of sound in air will (a) Become double (b)Become √2times (c) Become half

- (d) Remain same

Effect of density:

> At constant pressure and temperature speed of sound in air is inversely proportional to root

$$v \propto \frac{1}{\sqrt{\rho}} \qquad OR \qquad \frac{v_1}{v_2} = \frac{\sqrt{\rho_2}}{\sqrt{\rho_1}}$$
where densities of ρ_2 to H in 16 .

- \triangleright Since ratio between densities of O_2 to H_2 is 16:1 hence ratio between speed of sound in
- $\Rightarrow \frac{v_{0_2}}{v_{H_2}} = \frac{1}{4} \text{ OR } \frac{v_{H_2}}{v_{0_2}} = \frac{4}{1} \text{ OR } v_{H_2} = 4v_{0_2}$

Example:

At same temperature and pressure in which of following gas speed of H₂ lowest density and (a) Ho

Effect of Temperature:

At constant pressure and temperature speed of sound increases by increasing

Reason: By increasing temperature, volume increases and density decreases so speed

At any temperature t° C the volume of gas is given as $V_t = V_o(1 + \beta t)$ Where β is coefficient of volume expansion and $\beta = \frac{1}{273}$

$$V_t = V_o \left(1 + \frac{t}{273} \right)$$

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> Speed of sound in air is directly proportional to square root of absolute temperature (Temperature in Kelvin)

$$v \propto \sqrt{T}$$
 OR $\frac{v_1}{v_2} = \sqrt{\frac{r_1}{r_2}}$ OR $T \propto v^2$

Example:

At what temperature speed of sound will become If v is doubled, Temperature should be 4double as that is at 10°C

(a) 40 °C

(b) 313°C

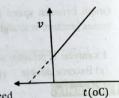
(c) 895°C

(d) 1132°C

Solution: $v \propto \sqrt{T}$ or $T \propto v^2$

$$T = 4(10 + 273) = 4(283)$$

= 1132K = 1132 - 273 = 895°C



> Speed of sound at any temperature t(°C) is given as

$$v_t = v_o + 0.61t$$

Note

If speed becomes n-times then absolute

temperature will become n^2 times $(T' = n^2T)$

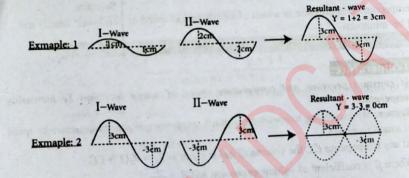
if $t \ll 273$

> With one degree or one Kelvin rise in temperature speed of sound increases by 0.61 m/s or 61 cm/s.

PRINCIPLE OF SUPERPOSITION

➤ If two or more waves are simultaneously acted on medium particle then resultant displacement of particle is algebraic sum of their individual displacements.

$$Y = Y_1 + Y_2 + \cdots + Y_n$$



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Three cases of Principle of Superposition

- > Interference: When two waves of same frequency and travelling in same direction superpose with each other.
- > Beats: When two waves of slightly different frequencies but travelling in same direction superpose with each other.
- > Stationary: When two waves of same frequency but travelling in opposite direction superpose with each other.

INTERFERENCE

> Superposition of two waves of same frequency and travelling in same direction results a phenomenon called interference.

Constructive Interference:

UNIT 04

Constructive interference occurs if waves are in phase and they reinforce the effect of each other.

- Phase difference = even $\pi = (2n)\pi$
- Path difference = $n\lambda$ (integral multiple of 1).
- \triangleright If A_1 and A_2 are amplitude of two waves then resultant amplitude will be $A_1 + A_2$.
- > Relation between intensity and amplitude is intensity $\propto (amplitude)^2$

Note

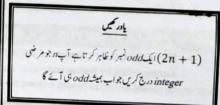
Waves having constant phase difference are called coherent waves.

Destructive Interference:

Destructive interference occurs if waves are out of phase and they cancel out the effect of each other.

- Phase difference = odd $\pi = (2n + 1)\lambda$
- Path difference = $(2n + 1)\frac{\lambda}{2}$ (odd integral multiple of $\frac{\lambda}{2}$).

Resultant amplitude will be $A_1 - A_2$.



Example 1:

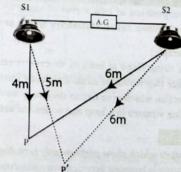
If two speakers are producing sound waves of wavelength $2m(\lambda = 2m)$ as shown in figure. If two waves have same amplitude then find resultant

displacement at point P and P'. At point P path difference between two waves is

$$\Delta S = 6m - 2m = 4m = 2(2m)$$

$$=2\lambda \quad (:: \lambda=2m)$$

Since path difference is 2λ hence 2^{nd} order maxima occur at point P.



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At point P' path difference between two waves is

$$\Delta S = 6m - 5m = 1m = \frac{\lambda}{2} (\because \lambda = 2m)$$

Since path difference is $\frac{\lambda}{2}$ hence 1st order maxima occur at point P.

Resultant displacement = A - A = 0

BEATS

- > Superposition of two waves having slightly different frequency but travelling in same direction results a phenomenon called beats.
- Beats are periodic fluctuations between maximum and minimum sound.
- \triangleright A single tuning fork produces sound waves of single frequency say f = 32 Hz
- > By loading some wax or plasticize or prongs of tuning forks its frequency decreases say $f = 30 \, Hz.$
- > If two tuning forks are sounded together beats are produced having beat frequency 2Hz = (32 - 30).
- Beat frequency is always equal to difference between the frequencies.

$$f_{beat} = f_A - f_B$$

If two sound waves of frequencies 50 Hz are travelling in same direction then Example:

$$f_{beat} = 54 - 50 = 4Hz$$

- > If beat frequency (number of beats per second) is greater than 10Hz. Beats can not be distinguished by human ear.
- > Beats are useful in tuning a string instruments.

STATIONARY WAVES

Superposition of two waves of same frequency but travelling in opposite direction results a phenomenon called stationary waves or standing waves.

Example:

If a string fixed at both of its ends is plucked from its center two waves of same frequency travels in opposite direction which give rise to stationary waves.



String vibrates in a loop and nodes and anti-nodes are formed.

Nodes:

Points which show permanently zero displacement are called nodes.

Energy is bounded between two consecutive nodes.

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OSCILLATIONS & WAVES

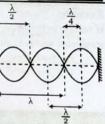
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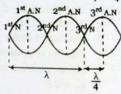
Anti-Nodes: Points which vibrating with maximum amplitude are called anti-nodes.

- > All the particles of string execute SHM except nodes.
- > Distance between two consecutive nodes is -
- > Distance between node and next anti-node is \(^{\lambda}\)
- ➤ Distance between two consecutive antinodes is -

Example:

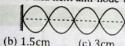
Consider string is vibrating in three loops. What is distance between first node and third anti-node





Example:

If 12cm string is vibrating in four segments (loops) then distance between node and next anti-node will be



(a) 0.75cm

(c) 3cm

Solution: $L = 4\left(\frac{\lambda}{2}\right)$

$$4\left(\frac{\lambda}{2}\right) = 12cm$$

$$\lambda = 6cm \text{ thus}$$

= 1.5cm

STATIONARY WAVES IN STRETCHED STRING

- Waves travelling in stretched string are transverse waves.
- > If a stretched string is plucked two transverse waves travelling in opposite direction give rise to stationary waves.

(d) 6cm

Speed of Waves: Speed of transverse waves in a stretched string is given as

- o F is tension in the string
- o m is mass per unit length of string Unit of m is kgm-1

> Speed is directly proportional to square root of tension and inversely proportional to square root of mass per unit length of string.

> Speed of waves in stretched string is independent of length of string, number of loops and frequency of vibration.

AT PREP BOOK

Example:

If tension in the string becomes four time than speed of transverse waves in string will become

- (a) Four times (c) One fourth
- (b) Two times (d) One half
- Solution:

As v x VF So, speed will become two

JECK speede 255 Tension

I-mode of vibration:

If a string of length ℓ is plucked from length $\frac{\ell}{2}$ it will vibrate in single loop.

- > Number of loops formed = 1
- Number of nodes formed = 2
- > Number of Anti-nodes formed = 1
- > String vibrates with maximum wavelength i.e. $\lambda_1 = 2\ell$
- String vibrates with minimum frequency i.e. $f_1 = \frac{1}{2\ell} \sqrt{\frac{F}{m}}$
- f₁ is known as fundamental frequency, fundamental tone or I-harmonic.

Law of length	Law of tension	Law of mass
$f \propto \frac{1}{4}$	$f \propto \sqrt{F}$	$f \propto \frac{1}{\sqrt{m}}$

II mode of vibration:

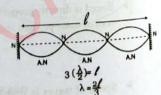
If a string is plucked from length $\frac{\ell}{4}$ it vibrates in two loops.

- ➤ Number of loops formed = 2
- Number of nodes formed = 3
- Number of Anti-nodes formed = 2
- > String vibrates with wavelength i.e. $\lambda_2 = \frac{\lambda_1}{2} = \ell$
- > String vibrates with frequency $f_2 = 2f_1$

III mode of vibration:

If a string is plucked from length $\frac{\ell}{6}$ it vibrates in two loops.

- ➤ Number of loops formed = 3
- ➤ Number of nodes formed = 4
- ➤ Number of Anti-nodes formed = 3
- String vibrates with wavelength i.e. $\lambda_3 = \frac{\lambda_1}{3} = \frac{2\ell}{3}$
- > String vibrates with frequency $f_2 = 2f_1$



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Harmonics:

UNIT 04

Such oscillations in which each frequency is integral multiple of fundamental frequency are called harmonics.

- > Only harmonics are produced in stretched string having frequencies $f_1, 2f_1, 3f_1, 4f_1, \dots$ and wavelength $\lambda_1, \frac{\lambda_1}{2}, \frac{\lambda_1}{3}, \frac{\lambda_1}{4}, \dots$
- > Frequencies other than harmonics are damped out quickly.

Example:

If fundamental frequency is 20Hz then which of the following frequency waves can not be produced in stretched string.

(a) 40 Hz

- (b) 60 Hz
- (c) 70 Hz (d) 80 Hz

Solution:

70 Hz is not integral multiple of 20 Hz.

nth-Harmonic:

- > String is plucked from = $\frac{\ell}{2n}$
- Number of loops formed = n
- Number of nodes formed = n + 1
- Number of antinodes formed = n

Frequency:

$$f_n = nf_1$$
 OR

$$f_1 = \frac{1}{2\ell} \sqrt{\frac{F}{m}}$$

Where
$$n=1,2,3,...$$

Wavelength:

$$\lambda_n = \frac{\lambda_1}{n}$$

$$\lambda_n = \frac{2\ell}{n}$$

Where n=1,2,3,...

Over Tones:

An overtone is any frequency among harmonic series that is greater than fundamental

Examples:

Frequency of 1^{st} overtone = $2f_1$

Frequency of 2^{nd} overtone = $3f_1$

Frequency of 3^{rd} overtone = $4f_1$

requency	f_1	$2f_1$	3f ₁	A.f.	
Mode of vibration	First	Second	Third	Fourth	5f ₁
<i>larmonic</i>	First	Second	Third	Fourth	Fifth
Over tone	Fundamental tone	First	Second	Third	Fourth

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APPLICATIONS

- > Nuts on guitar are used to change the tension in string and thus change the frequency.
- > String of different mass per unit length are used to produce note of different frequencies.
- > One can move hand on the neck of guitar to change the length of string to produce note of different frequencies.

Example:

If frequency of 5th over tone is 60 Hz then frequency 2nd harmonic will be

If three consecutive frequencies of a harmonic series

given as 60 Hz, 75 Hz, 90 Hz then frequency of 1st

(a) 10 HZ (b) 20 HZ (c) 25 HZ (d) 30 HZ

Solution:

5th over tone = $6f_1 = 60$ $\Rightarrow f_1 = 10 \, Hz$

Frequency 2nd harmonic $= 2f_1 = 20 Hz$

Solution:

 $f_1 = 75 - 60 = 15 \, Hz$ Frequency of 1st over tone $= 2f_1 = 2(15) = 30 Hz$

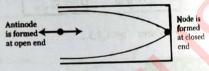
overtone will be (a) 5 HZ

Example:

(b) 15 HZ (c) 30 HZ (d) 60 HZ

STATIONARY WAVES IN AIR COLUMN

- > Longitudinal wave (sound or pressure waves) can produce stationary waves in air column.
- When we blow air in an air column then the relation between incident and reflected wave depends on whether reflecting end is open or closed
- > (i) At open end air molecules have complete freedom of motion and can vibrate with maximum displacement and thus it behave as anti node.



- > (ii) At closed end motion of air molecules is restricted and displacement of air molecules remains permanently zero thus it behave as node.
- > Although sound waves are longitudinal waves but the displacement of air molecules can be represented by a transverse wave.

Example: Which of the following mode of vibration can not be produced in air column?







(d) All of these

Reason: At open end always anti-node and at closed end always node is formed.

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Case-I: Pipe is open at both ends

I-mode of vibration

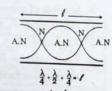
UNIT 04

Consider a pipe of length & open at both ends.

- > Number of loops formed = 1
- > Number of nodes formed = 1
- Number of anti-nodes formed = 2
- \triangleright Wavelength: $\lambda = 2\ell$ (maximum wavelength)
- > Frequency: $f_1 = \frac{v}{2e}$ (Where v is speed of sound in air)
- > fris known as fundamental frequency or fundamental harmonic or fundamental tone.

II-mode of vibration

- Number of loops formed = 2
- Number of nodes formed = 2
- Number of anti-nodes formed = 3
- Wavelength: $\lambda = \frac{\lambda_1}{2} \Rightarrow f_2 = \frac{2\ell}{2}$
- Frequency: $f_2 = 2f_1 \Rightarrow f_2 = \frac{2v}{24}$



nth-Harmonic:

- Number of loops formed = n
- \triangleright Number of nodes formed = n
- ➤ Number of antinodes formed = n+1

Frequency:

$$f_n = nf_1$$
 OR

$$f_n = \frac{nv}{2\ell}$$

Where n=1,2,3,...

Wavelength:

$$\lambda_n = \frac{\lambda_1}{n}$$

OR

$$\lambda_n = \frac{2\ell}{n}$$

Where n=1,2,3,...

Harmonics:

Such oscillations in which each frequency is integral multiple of fundamental frequency are

- > In an open end pipe only harmonic are produced having frequencies $f_1, 2f_1, 3f_1, 4f_1, \dots$ and wave length $\lambda_1, \frac{\lambda_1}{2}, \frac{\lambda_1}{3}, \dots$
- Frequencies other than harmonics are damped out quickly.

Over Tones:

An overtone is any frequency among the harmonic that is greater than fundamental frequency.

Examples: Frequency of 1^{st} evertone = $2f_1$ Frequency of 2^{ad} overtone = $3f_1$

Frequency of 3^{rd} overtone = $4f_1$ MDCAT PREP BOOK

Fourth

Harmonics:

Such oscillations in which each frequency is integral multiple of fundamental frequency are called harmonics.

- > If pipe is closed at one end only odd harmonics are produced having frequencies $f_1, 3f_1, 5f_1, \dots$ and wavelength $\lambda_1, \frac{\lambda_1}{3}, \frac{\lambda_1}{5}, \dots$
- > Frequencies other than odd harmonics are damped out quickly.

Over Tones:

An overtone is any frequency among the harmonic series that is greater than fundamental

Frequency of 1st overtone = $3f_1$ Examples: Frequency of 2^{nd} overtone = $5f_1$ Frequency of 3^{rd} overtone = $7f_1$

tone

Frequency	f_1	$3f_1$	5f ₁	7f ₁	0.6
Mode of vibration	First	Second	Third	Fourth	9f ₁ Fifth
Harmonic	First	3 rd	5 th	7 th	Oth
Over tone	Fundamental	First	Second	Third	E

Note: If pipe is open at both ends, both even and odd harmonics are produced. But if pipe is closed at one end only odd harmonics are produced. So open end pipe is richer in harmonics than closed end pipe.

DOPPLER'S EFFECT

Apparent change in frequency of waves due to relative motion between source and observer is called Doppler's effect.

Doppler's effect was first observed for light coming from a distant star.

Doppler's effect is applicable for all types of waves (longitudinal or Transverse, mechanical or electromagnetic)

change" distance د observer اور source مرف تب پير ابو گاجب change" distance د change اور Frequency

(Doppler's effect is observed)

- If distance between source and observer decreases then frequency increases.
- If distance between source and observer increases then frequency decreases.
- If distance between source and observer does not change then frequency remains same and



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Third

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Mode of vibration	First	Second	Third	Fourth	Fifth
Harmonic	First	Second	Third	Fourth	Fifth
Over tone	Fundamental	First	Second	Third	Fourth

Case-II: Pipe is open at both ends

I-mode of vibration

Consider a pipe of length ℓ open at both ends.

- Number of loops formed = $\frac{1}{2}$
- > Number of nodes formed = 1
- Number of anti-nodes formed = 1
- Wavelength: $\lambda_1 = 4\ell$ (maximum)
- Frequency: $f_1 = \frac{v}{2\ell}$ (minimum)
- \triangleright f_1 is known as fundamental frequency or fundamental harmonic or fundamental tone.

Note: Single loop is produced in closed end pipe as shown in the following figures

Because at open end always anti-nodes and at closed end always node is formed. Hence 2nd harmonic cannot be produced in closed end pipe.



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5f1

41

A.N

II-mode of vibration

- Number of loops formed = $\frac{3}{2}$
- Number of nodes formed = 2

- Frequency: $f_3 = 3f_1 \Rightarrow \frac{3v}{4\ell}$

Number of anti-nodes formed = 2 Wavelength: $\lambda_3 = \frac{\lambda_1}{3} \Rightarrow \frac{4\ell}{3}$

nth-Harmonic:

- Number of loops formed = $\frac{n}{2}$
- Number of nodes formed = $\frac{n+1}{2}$
- Number of anti-nodes formed = $\frac{n+1}{2}$

Frequency:

Where n= 1,3, 5,.....

Wavelength:

 $f_n = nf_1$ Where n= 1,3,5,.....

Case ii:

Relative speed مرفت Achange کردامد

> If observer is moving towards the source then relative speed increases and

$$v_{rel} = v + u_o$$

where v is speed of the wave and u_0 is speed of observer.

> If observer is moving away from source then relative speed of wave decreases and

$$v_{rel} = v - u_o$$

> If observer is at rest then relative speed of wave does not change.

Case iii: (Doppler shift is produced only if source is moving)

Wave length مرفت بداء كاجر source move

> If source is moving towards the observer than apparent wavelength decreases

and
$$\lambda' = \lambda - \Delta \lambda$$

> If source is moving away from the source apparent wavelength increases

and
$$\lambda' = \lambda + \Delta \lambda$$

> If source is at rest then wavelength remains same $\lambda' = \lambda$ and $\Delta \lambda = 0$

Doppler's Shift:

Change in wavelength $\Delta\lambda$ is known as Doppler shift and

$$\Delta \lambda = \frac{u_s}{f}$$

Where u_s is speed of source and f is actual frequency Doppler's shift only depends upon two factors.

(i) Speed of source ∆ \alpha \alpha u_s

(ii) Actual Frequency Δλα 1

Example:

If two cars A and B horn the sound of same frequency while approaching an Car A observer with velocities 20 m/s and 30 m/s respectively then Doppler shift is maximum for? (a) Car A (b) Car B (c) Same for A and B (d) Zero for A and B

Solution:

Solution:

Reason: $(\Delta \lambda \propto u_s)$

IR

Reason:

Doppler's shift صرفت بيداموكي

-8- Smove Jy-

 $(\Delta \lambda \propto \frac{1}{f})$

If a star is moving towards the earth with speed v then Doppler shift is maximum for?

(a) IR

(b) uv

(c) Visible light

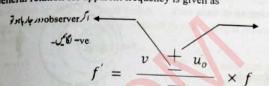
(d) same for all E.M waves

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Apparent Frequency:

UNIT 04

General relation for apparent frequency is given as



by observer I

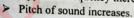
اگر source قریب آرامون

+ve John source لكائس

1. If observer is moving towards stationary source $(u_s=0)$

-66 +ve

> Apparent frequency increases.



 \triangleright Wavelength remains same and $\Delta\lambda = 0$

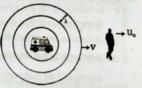


2. If observer is moving away from stationary source $(u_s=0)$

$$f' = \left(\frac{v - u_o}{v}\right) f$$

> Apparent frequency decreases.

Wavelength remains same and $\Delta \lambda = 0$

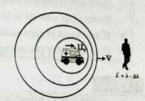


3. If source is moving towards stationary source $(u_0=0)$

$$f' = \left(\frac{v}{v - u_s}\right) f$$

> Apparent frequency increases.

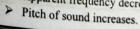
 \triangleright Wavelength remains same and $\Delta \lambda = \frac{u_s}{f}$

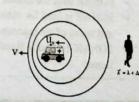


4. If source is moving away from stationary source

$$f' = \left(\frac{v}{v + u_s}\right) f$$

Apparent frequency decreases (f' < f).





 \triangleright Wavelength increases $(\lambda' > \lambda)$.

5. If source and observer are moving away from each other.

$$> f' = \left(\frac{v + u_o}{v - u_s}\right) f$$

- \triangleright Apparent frequency increases (f' > f)
- \triangleright Wavelength decreases $(\lambda' < \lambda)$

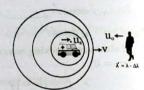




6. If source and observer are moving towards each other.

$$f' = \left(\frac{v - u_o}{v + u_s}\right) f$$

- \triangleright Apparent frequency decreases (f' < f).
- \triangleright Wavelength increases $\lambda' > \lambda$



APPLICATIONS OF DOPPLER'S EFFECT:

RADAR:

- > RADAR is an abbreviation of "radio amplification detection and ranging".
- > It uses radio waves for detection of objects.
- ightharpoonup RADAR is used to determine the range $\left(R = \frac{1}{2}ct\right)$ where c is speed of light and t is time between transmission and reception of radio signal.



- RADAR is used to determine speed of objects $(u_s = f(\Delta \lambda))$ where f is actual frequency of transmitter and $\Delta\lambda$ is Doppler's shift.
- If an object is approaching the RADAR then λ decreases.
- \triangleright If an object is preceding the RADAR then λ increases.

SONAR:

- > SONAR is an abbreviation of "sound navigation and ranging".
- > SONAR uses ultrasound waves.
- > SONAR is used for detection and to determine range and speed of submarines.
- SONAR is used to fixed sea depth and undersea mines.



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UNIT 04 Red Shift:

shift.

If a star is moving away from earth its

wavelength (towards red) it is known as red

spectrum is shifted towards longer

Blue Shift:

If star is moving away from earth its spectrum is shifted towards shorter wavelength (blue end) it is known as blue shift.

Galaxy receding

Light waves are stretched (red-shift) Light waves are compressed (blue-shift)

RADAR Speed Trap:

- RADAR speed trap uses microwaves to determine vehicles speed.
- Speed of vehicle can be calculated by $(u_s = f\Delta\lambda)$ where f is actual frequency and $\Delta\lambda$ is

Do You Know

Ultrasound waves of frequencies 5 MHz to 10 MHz are directed towards artery to monitor blood flow through major arteries apparent frequency depends upon velocity of flow of blood

Do You Know

Echolocation allows dolphins to detect small difference in the shape, size and thickness of object.

Do You Know

Bat navigates and find food by echo

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UNIT 05 >>

HEAT AND THERMODYNAMICS

Heat: Heat is type of energy flowing due to difference in temperature of two bodies.

Temperature::

Macroscopically temperature is measure of hotness or coldness of a body.

> Microscopically temperature is measure of average K.E of molecules of a substance.

KINETIC MOLECULAR THEORY OF GASES

- > There are two evidence for kinetic molecular theory of gases.
 - (ii) Brownian motion (i) Diffusion

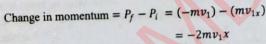
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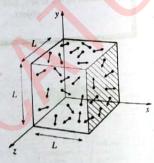
- > All gases consists of very small discrete particles called molecules.
- > Gas molecules are in state of random motion in all possible directions with different velocities.
- Molecules of gas are constantly colliding with each other and with walls of container.
- > Collision of molecules is perfectly elastic collision.
- > Molecules of gas do not exert force on each other except collision.
- > Volume occupied by gas molecules is negligible as compared to volume of gas. (volume of container).

PRESSURE OF GAS

Pressure of gas is defined as momentum transferred to walls of container per second per unit area due to continuous collisions of gas molecules with the walls of container.

- Consider N number of molecules enclosed in a cubical P box of side 'l'
- If a molecule of mass 'm' moving with velocity v1x rebounds back with same velocity (due to elastic collision). then





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- > Time between two consecutive collisions $\Delta t = \frac{2\ell}{2}$
- No. of collisions per second = $\frac{v_{1x}}{v_{1x}}$
- > Force exerted by molecule on the wall = thange in momentum time

$$F_{1x} = \frac{mv_{1x}^2}{\ell}$$

Total force on the wall ABCD = $F_{1x} + F_{2x} + \cdots + F_{Nx}$

$$=\frac{mv_{1x}^2}{\ell}+\frac{mv_{2x}^2}{\ell}+\cdots+\frac{mv_{Nx}^2}{\ell}$$

Pressure on the wall ABCD = $\frac{m}{\ell^3}(v_{1x}^2 + v_{2x}^2 + \dots + v_{Nx}^2)$

$$P_{x} = \frac{m\ell}{\ell^{3}} \left(\frac{v_{1x}^{2} + v_{2x}^{2} + \dots + v_{Nx}^{2}}{N} \right)$$

$$P_x = \rho < v_x^2 >$$

- **Density of gas** = $\frac{Total\ mass}{Total\ volume} = \rho = \frac{mN}{\ell^3}$
- > Average velocity = $\frac{v_{1}+v_{2}+\cdots+v_{N}}{N}$ = $\langle v \rangle$ = 0
- > Average square velocity = $\frac{v_1^2 + v_2^2 + \dots + v_N^2}{N} = \langle v^2 \rangle \neq 0$
- > Root mean square velocity = $\sqrt{\langle v^2 \rangle} = \sqrt{\frac{v_1^2 + v_2^2 + \dots + v_N^2}{N}} \neq 0$
- > Since molecules are in random motion hence $\langle v_x^2 \rangle = \langle v_y^2 \rangle = \langle v_z^2 \rangle$
- Similarly $P_y = \rho < v_y^2 > \text{and } P_z = \rho < v_z^2 >$
- > $< v^2 > = < v_x^2 > + < v_y^2 > + < v_z^2 > = 3 < v_x^2 >$ $\Rightarrow < v_x^2 > = \frac{1}{3} < v^2 > \text{ and } P = \frac{1}{3} \rho < v^2 >$
- $P_x = P_y = P_z$ (Pascal's law)
- > Net pressure on any wall of container is given as

$$P = \rho < v^2 >$$

Example: If velocity or speed of each molecule is doubled then pressure of gas will become

(a) Double(b) Half(c) Four Times \checkmark (d) Remains same

Solution: As $P \propto < v^2 >$ If v is doubled, P wil become four times.

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Example:

If average square velocity of gas molecules is doubled, pressure of gas will become

(a) Double ✓ (b) Half (c) Four Times (d) Remains same

Solution: As $P \propto < v^2 >$

If $\langle v^2 \rangle$ is doubled P will become double.

Kinetic Equation of gas

ightharpoonup Kinetic equation of gas is given as $P = \frac{1}{3}\rho < v^2 > = \frac{mN}{3V} < v^2 >$

$$\Rightarrow PV = \frac{1}{3}mN < v^2 >$$

Relation between Pressure and <K.E>

$$P = \frac{mN}{3V} < v^2 > = \frac{2N}{3V} < \frac{1}{2}mv^2 >$$

$$\Rightarrow P = \frac{2N}{3V} < K.E >$$

➤ If $\frac{N}{V} = N_o = constant \text{ then } P \propto < K.E >$

General Gas Equation:

> General gas equation for 'n' moles is given as

$$PV = nRT$$

Where R is general gas constant and in SI units $R = 8.314 \, Jmol^{-1}K^{-1}$

- ightharpoonup If n and T are constant then $P \propto \frac{1}{v}$ (Boyle's law)
- > If n and T are constant then $V \propto T$ (Charle's law)
- ≥ If P and T are constant then $V \propto n$ (Avogadro's law)
- ≥ If n and V are constant then $P \propto T$ (Lussac's law)

Boltzman Constant: (k)

The ratio of general gas constant to Avogadro's number is called Boltzmann constant.

$$k = \frac{R}{N_A} \quad \text{and } k = \frac{8.314}{6.02 \times 10^{23}} = 1.38 \times 10^{-23} J K^{-1}$$

Example: The product of Boltzmann and Avogadro's number (in SI units) is always equal to

(a) $8.314 \checkmark$ (b) 6.02×10^{23}

(c) 1.38×10^{-23} (d) one

Solution:

 $N_A \times k = R = 8.314$

Example: The ratio of unit of Boltzmann to unit of General gas constant is equal to

(a) mole

(b) $mole^{-1} \checkmark$ (c) $\int mole^{-1}$ (d) one

 $\frac{mole^{-1}K^{-1}}{JK^{-1}} = mole^{-1}$

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HEAT AND THERMODYNAMICS Relation between Temperature and <K.E>

> At any temperature T (Kelvin)<K.E> is given as K.E.





- > < K.E > ∝ T
- > Average K.E of molecules only depends upon temperature and independent of nature of gas.

Example: At room temperature which of the following gas molecules have greater average kinetic energy.

(a) H2

(b) CO₂ (c) N₂ (d) All have same energy

Solution:

Since temperature is same so <K.E> is also same.

Example:

UNIT 05

At temperature 27°C, average K.E of gas molecules will be

(a) 6×10^{-21} J (c) 600×10^{-21} (b) 60×10^{-21} J (d) 0.6×10^{-21} I

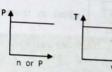
Solution: $\langle K.E \rangle = \frac{3}{2}kT$ $= \frac{3}{2}(1.38 \times 10^{-23})(300)$ $(put 3 \times 1.38 \approx 4)$ $=600 \times 10^{-23} = 6 \times 10^{-21}$

Boyle's Law:

- If number of moles of gas and temperature are kept constant then volume of gas is inversely proportional to pressure.
- $V \propto \frac{1}{p}$ (if n and T = constant)
- \triangleright PV = k(where k is constant and k = nRT)
- $P_1V_1=P_2V_2$
- Different graph for Boyle's law:







Example: If at two different constant temperatures T_1 and T_2 the graph between P and $\frac{1}{\nu}$ is shown in the figure then.



(a) $T_1 > T_2$ (c) $T_1 = T_2$ (b) $T_1 < T_2$ (d) None

Solution:

= PV = k = nRT⇒ Slope ∝ T

Slope of T_2 larger then T_1 so $T_2 > T_1$

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Charle's Law

- > If number of moles of a gas and pressure are kept constant then volume of gas is directly proportional to its absolute temperature.
- $V \propto T$ (If n and P are constant)
- $\Rightarrow \frac{V_1}{T_1} = \frac{V_2}{T_2} \text{ or } V_1 T_2 = V_2 T_1$
- > Different graph for Charle's law.







$$\frac{v}{r}$$

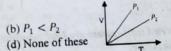
$$\Rightarrow \frac{V}{T} = k$$
 (where k is constant and $k = \frac{nR}{P}$) as $PV = nRT \Rightarrow \frac{V}{T} = \frac{nR}{P}$

Example: If at two different constant pressures P_1 and P_2 the graph between volume and temperature of a gas is shown in the figure below then

(a)
$$P_1 > P_2$$

(b)
$$P_1 < P_2$$

(c)
$$P_1 = P_2$$



Solution:

Slope of graph =
$$\frac{V}{T} = \frac{nR}{P}$$

 $\Rightarrow Slope \propto \frac{1}{P}$
 $so P_2 > P_1$

Root mean square velocity:

> Root mean square velocity is given as $v_{rms} = \frac{v_1^2 + v_2^2 + \dots + v_N^2}{N}$



where 'm' is mass of each molecule.

- Root mean square velocity depends upon
 - 1. Temperature $(v \propto \sqrt{T})$

2. Nature of the gas $\left(v \propto \frac{1}{\sqrt{m}}\right)$.







Example: At room temperature which of the following gas molecules will have greater root mean square velocity (d) All have same energy (c) N₂

(b) CO2

Solution: Hence Since $v_{rms} \propto \frac{1}{\sqrt{m}}$ H₂ has greater v_{rms}

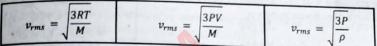
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UNIT 05

HEAT AND THERMODYNAMICS

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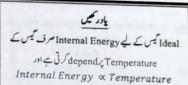
Other relations for root mean square velocity are



Internal Energy:

Sum of all forms of molecule energies (P.E and K.E) is called internal energy.

- For ideal gas molecule P.E = 0, because there is no force of attraction or repulsion between molecules.
- > If gas is mono-atomic molecules posses only translational K.E.
- ➤ If gas is diatomic or polyatomic molecules posses translational, vibrational and rotational
- ➤ Since K.E only depends upon temperature and internal energy of an ideal gas only depends upon temperature.
- > By increases temperature internal energy increases and vice versa.
- > At constant temperature (isothermal process) U = constant and $\Delta U = 0$.
- A function which only depends upon initial and final states and independent of path followed is called state function.



- ➤ Change in internal energy is a state function (i.e independent of path followed)
 - \triangleright If a system changes state (P_1, V_1) to (P_2, V_2) along two different path as shown in figure then

$$\Delta U_1 = \Delta U_2$$



Sign convensions:

Heat added to system	Heat removed from system	Work done by the system	Work done on the system	increases then	If internal energy decreases
+ve	-ve	+ve	-ve	ΔU +ve	then Δ <i>U</i> -ve

Work done in thermodynamics:

Work done at constant pressure P is

$$W = P\Delta V \text{ or } W = P(V_f - V_i)$$

- > Work done by the system is taken positive.
- Work done on the system is taken negative.
- > Area under P V graph is equal to work done.

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Isothermal Process:

> Boyle's law is valid

Since T = constant, hence internal energy also remains constant and $\Delta U = 0$.

PV = constant.

> Curve representing the isothermal process is called isotherm

> Mostly process which are carried out slowly are isothermal.

Isothermal Expansion

Mechanical energy is converted into heat.

(مطلب جو mechanical energy بري ك و heat ك على يم فارئ موكي)

ightharpoonup T = Constant and $\Delta U = 0$

Work done is +ve.

First law of thermodynamics takes the form $Q = W(: \Delta U = 0)$.

A process which is carried out at constant temperature is called isothermal process.

Example: If volume V of gas increased by 200% at pressure P then the work done by the system is

(a) PV

(b) 2PV

(c) 3PV

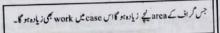
(d) 4PV

Solution: $V_f = V + \frac{200V}{100} = 3V$ $W = P(V_f - V_i)$ = P(3V - V) = 2PV

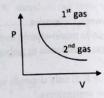
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Example: P-V graph for two gases is shown in the figure below. For same change in volume which of following option is correct.

- (a) $W_1 = W_2$
- (b) $W_1 < W_2$
- (c) $W_1 > W_2$
- (d) $W_2 > W_1$ and $W_1 = 0$



Solution: $W_1 > W_2$



Example: A system undergoes a cycle process as shown in the figure below then work done will be

(a) PV

- (b) 2PV
- (c) 3PV
- (d) 4PV



Solution:

$$W_1 = Area of triangle$$

$$= \frac{1}{2}(3P - P)(3V - V)$$

FIRST LAW OF THERMODYNAMICS

When heat Q is added to system it appears as increases in internal energy which is stored in the system plus work done by the system.

$$Q = \Delta U + W$$

Where ΔU is change in internal energy $(\Delta U = U_f - U_i)$

First law of thermodynamics is actually law of conservation of energy in thermodynamics.

Example 1: Bicycle Pump:

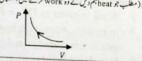
When we compress the air in a bicycle pump by closing its nozzle. Mechanical work is done on it. Since no heat flow occurs so this mechanical energy is converted into internal energy. Thus internal energy increases and its temperature increases.

Example 2: Metabolism:

- Energy transforming process that occurs in an organism is called metabolism.
- Energy from food we eat is stored in the body in form of internal energy.
- \triangleright By doing some mechanical work internal energy decreases. $\Delta U = Q W$

\rightarrow For isothermal process modulus of elasticity of gas is equal to pressure of the gas (E = P). Isothermal Compression

- $\Delta U = 0$ and T = Constant
- Work done is -ve.
- Heat is converted into mechanical energy. -Q = -W(مطلب جو heat م وی کے وو work کے میں استعال ہوگ)

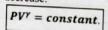


_ Isotherm .

Adiabatic Process

A process in which no heat enters or leaves from the system Q = 0.

- > Temperature of the system may increase or decrease.
- Relation between pressure and volume is



- Curve representing the adiabatic process is called adiabat.
- Adiabat is γ times steeper than isotherm.
- First law of thermodynamics takes form $W = -\Delta U$ (: Q = 0)
- Mostly process which are carried out rapidly are adiabatic.
- For adiabatic process modulus of elasticity of gas is given as $E = \gamma P$



A	Adiabatic Expansion	
	Q = 0	
4	Work done is +ve.	
4	Internal enem	
4	Internal energy is converted into work. $W = -\Delta U$	1
	Con Contract	1

(مطلب میس مختا work کے گیا تی internal energy کر مطلب کیس مختا > Internal energy decreases so temperature decreases.

Adiabatic Compression Q = 0

- ➤ Work done is -ve.
- Mechanical energy is converted into internal energy $\Delta U = -W$ (مطلب جنا work کی کے اتی internal energy کی کے اس work ا
- > Internal energy increases so temperature increases.

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Examples:

- Compressions and rarefactions of air through which sound waves are passing.
- Rapid escape of air from burst tyre.
- Cloud formation. iii.

Isochoric process (Isometric process):

A process which is carried out at constant volume is called isochoric process ($\Delta V = 0$).

- No work is done $(W = P\Delta V = 0)$.
- First law takes the form. $Q = \Delta U$
- > If heat is added to system, internal energy increases thus temperature increases.
- > If heat is removed from system, internal energy decreases.

Example: Pressure cooker is an example of isochoric process in which volume is kept constant so W = 0 and heat added is entirely converted into internal energy.



Isobaric Process:

A process carried out at constant pressure is called isobaric process.

Work is given as $(W = P\Delta V)$.

E = P

- > In isobaric expansion heat is partially converted into internal energy and partially into work.
- > In isobaric compression work done on the system is partially converted into internal energy and partially into work.

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	1
1 1	1
1	1

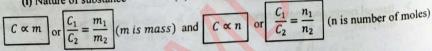
is partially converted and Adiabatic		Isochoric
Isothermal		W = 0
$\Delta U = 0$	Q = 0	$O = \Delta U$
0 = W	$W = -\Delta U$	AND IN HOLD BY MANAGEMENT
4	nD	$E = \infty$

MOLAR SPECIFIC HEAT

Heat Capacity

Amount of heat required to raise the temperature of a substance through one Kelvin is

- called heat capacity. > It is denoted by C and
- Its SI unit is JK^{-1} and in terms of base unit is $Kgm^2s^{-2}K^{-1}$.
- > Boltzmann constant, entropy and heat capacity have same units.
- > Heat capacity depends upon two factors
 - (i) Nature of substance
- (ii) Amount of substance.



- \triangleright Heat capacity for adiabatic process is zero. (: Q = 0).
- \triangleright Heat capacity for isothermal process is infinite. (: $\Delta T = 0$)

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Specific Heat:

Amount of heat required to raise the temperature of 1 kg substance through one Kelvin is called specific heat.

> It is denoted by 'C' and

$$C = \frac{Q}{m\Delta T}$$

- Its SI unit is $JKg^{-1}K^{-1}$ and in terms of base units is $m^2s^{-2}K^{-1}$.
- Specific heat only depends upon nature of substance and independent of amount of substance.
- For adiabatic process $Q = 0 \Rightarrow c = \frac{Q}{Q} = 0$
- > For isothermal process $\Delta T = 0 \Rightarrow c = \frac{Q}{m\Delta T} = \infty$

Example: Ratio of specific heat of 2kg water to specific heat of 4kg is

(a) 1:1 (b) 1:2 (d) 1:4

Solution: 1:1 (specific heat is independent of amount of substance)

Molar Specific Heat:

Amount of heat required to raise the temperature of one mole substance through one Kelvin is called molar specific heat.

- It is denoted by C and
- ightharpoonup Its SI unit is $Imol^{-1}K^{-1}$
- General gas constant and molar specific heat have same units.

(c) 2:1

- > Molar specific heat only depends upon nature of substance and independent of amount of
- For adiabatic process $Q = 0 \Rightarrow C = \frac{Q}{n\Delta T} = 0$
- For isothermal process $\Delta T = 0 \Rightarrow C = \frac{Q}{n\Delta T} = \infty$

In case of solids or liquids

When solids or liquids are heated their volume approximately remains constant.

$$\Rightarrow \Delta V = 0 \text{ and } W = 0$$
$$\Rightarrow O = \Delta U$$

► Heat is entirely converted into internal energy and no heat is used in doing work.

 $Q_{\nu} = nC_{\nu}\Delta T$

And

 $\Delta U = nC_V \Delta T$

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In case of gases

- > For gases, there are two types of molar specific heat
 - 1. Molar specific heat at constant volume
 - 2. Molar specific heat at constant pressure.

Molar	specific	heat	at	constant	volui	ne

- $V = constant \Rightarrow \Delta V = 0 \Rightarrow W = 0$
- \triangleright First law takes the form, $Q = \Delta U$
- > Heat is entirely converted into internal energy and no heat is used in doing work

$$\Delta U = nC_v \Delta T$$

Molar specific heat at constant Pressure

- $> W = P\Delta V$
- > First law take the form

$$Q_P = \Delta U + P \Delta V$$

- > Heat is partially converted into internal energy and partially used in doing work.
- > Molar specific heat at constant pressure is always greater than molar specific heat at constant volume $(C_P > C_V)$
- $> (C_P C_V = R)$
- $\gamma = \frac{\text{molar specific heat at constant pressure}}{\text{molar specific heat at constant volume}} \Rightarrow$
- \triangleright The value of γ is always greater than 1 and it has no dimension and no unit.

Gas	Mono Atomic	Diatomic	Polyatomic
$\gamma = \frac{C_P}{C_P}$	$\frac{5}{3} = 1.29$	$\frac{7}{5} = 1.4$	$\frac{9}{7} = 1.29$
$C_V = \frac{R}{R}$	3R	5R	7R 2
$C_V = \frac{1}{\gamma - 1}$ γR	> 5R	> 7R	$\frac{9R}{2}$
$C_P = \frac{1}{\gamma - 1}$	2	2	

$$-\gamma$$
 معلوم کرنے کے لیے کہ کی پنجے والی ویلیو کو $-\gamma$ multiply $-\frac{R}{2}$ معلوم کرنے کے لیے $-\gamma$ سلوم کرنے کے لیے کے اوپر والی ویلیو کو $-\gamma$ multiply کردیں۔

In case of Helium Gas the value of molar specific heat at constant volume is

- $(a) \frac{3R}{2} \checkmark$

- (b) $\frac{5R}{2}$ (c) $\frac{7R}{2}$ (d) $\frac{9R}{2}$

Solution:

Helium is a mono atomic

gas

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UNIT 06 >>

UNIT 06

ELECTOSTATICS

ELECTRIC CHARGE:

Charge is property associated with matter due to which it produces and experiences electric and magnetic effects.

ELECTROSTATICS

- > There are two types of charge (i) Positive charge (ii) Negative charge
- ➤ Like charges repel each other and unlike charges attract each other.





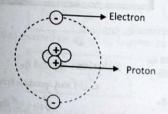
Example: Which of the following is greatest value of charge?

- (a) 10 C
- (b) 20 C
- (c) -5 C
- The smallest value of charge which can exist independently is $e = 1.6 \times 10^{-19}$

		1.6 × 10 1.6		
Particle	Electron or - ve β	Proton or +ve β	Neutron or γ-rays	α-particle
Charge	$-e = -1.6 \times 10^{-19} C$	$+e = 1.6 \times 10^{-19}C$	Zero	$+2e = 3.2 \times 10^{-19}C$
19 4	unit of characteristics			120 - 3.2 × 10 - C

- SI unit of charge is coulomb (in terms of base units A.s)
- > Every atom is electrically neutral (No. of electrons = No. of Protons)

Example: He-Atom



Net charge = +2e - 2e = 0

- Charge is quantized (charge is always an integral multiple of 'e')
- Law of conservation of charge

Q = ne

- Charge neither be created and nor be destroyed but can be transferred from one body to another and total charge always remains constant.
- Charge given to a conductor always resides on the outer surface.

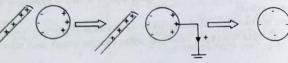
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Methods of charging:

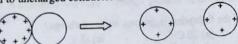
1. By Friction: By rubbing two bodies together both bodies are equally and oppositely charged due to transfer of electrons from one body to another. Examples: (i) When glass rod is rubbed with the silk, the glass rod becomes positively

charged and silk is negatively charged. (ii) Clouds also get charged by friction.

2. By Electrostatic Induction: If a charged body is brought near a neutral body one side of neutral body (closer to charged body) is oppositely charged and while the other side is similarly charged.

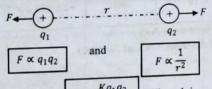


3. By Conduction: When a charged conductor in contact with an uncharged conductor, some charge is transferred to uncharged conductor thus both conductors are similarly charged.



COULOMB'S LAW

Force between two point charges is directly proportional to product of magnitude of charges and inversely proportional to square of the distance between them



Note Coulomb's Law is applicable only for point charge.

Where k is proportionality constant Kq_1q_2 \Rightarrow

Example: If charges are placed at corners of a square as shown in figure below then force is maximum between

(a) q_1 and q_2

Solution: q3 and q4 جن product &charges زياده و كالن ك در میان force بھی زیادہ ہوگی

(c) q3 and q4 (d) q_1 and q_4

"	42	unu	43
		am d	

$q_3 = 3\mu c \qquad q_2 = 2$	the day to say		In terms of base	Dimensions	
Constant	Value in Slaunits	SI unit	units		
K	9 × 10 ⁹		Kym s "	$ML^3T^{-4}A^{-2}$	
(in free space)		22 N - 1 2	$Kg^{-1}m^{-3}s^4A^2$	$M^{-1}L^{-3}s^4A^{-2}$	
	8.85×10^{-12}	$C^2N^{-1}m^{-2}$	Kg		

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 \triangleright ϵ_o is permittivity of free space and $K = \frac{1}{4\pi\epsilon_o}$

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2}$$

UNIT 06

Examples: Three equal and similar charges are placed at the corners of an equilateral triangle as shown in the figure then resultant force on q is acting along



(A) towards right

(C) upward

- (B) towards left
- (D) downward

So the resultant force on q is in upward direction

Solution Horizontal component are cancelled and vertical component are added up



ال طرح کے solve کر یک اور پی کا اور پی کا اور پی ا

components add بور کونے cancel مورے میں۔

charges ميشه charges كو طائ وال ralong كا الم

sisine & L & component Lise Langle & Liticomponents -2

USCOS BLECKS

Vector Form of Coulomb's Law:

 \triangleright Force exerted by q_1 on q_2 is given

$$\vec{F}_{21} = \frac{Kq_1q_2}{r^2}\hat{r}_{21}$$

Force exerted by q_2 on q_1 is given as

$$\vec{F}_{12} = \frac{Kq_1q_2}{r^2} \hat{\tau}_{12}$$

 $\vec{F}_{12} = \frac{Kq_1q_2}{r^2}\hat{r}_{12}$ $\vec{F}_{12} \leftarrow \vec{r}_{12}$

- Both forces are always equal in magnitude but opposite in direction.
- Coulomb's law obey the Newton's 3rd law of motion.

$$\vec{F}_{12} = -\vec{F}_{21}$$

Example: If 4C and 6C charges are placed near each other the ratio of forces acting on the charges will be

دو charges ميشدايك دو ارك رراب

(b)3:2(c)4:1

charge LI In Eforce (d)1:1V

כפין ונ אכסת

AT PRI P BOOK

or

UNIT 06 Properties:

Electric field lines are imaginary lines to visualize the electric field.

No. of electric field lines ∝ magnitude charge.

Electric field lines originate from positive charges and ends on negative charges.

ELECTROSTATICS

Lines are closer where field is strong and lines are path farther apart where field is weak. iv.

Tangent to field lines at any point gives the direction of electric field at that point.

No two field lines can cross each other because electric field has only one direction at a given point.

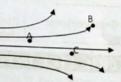
If the distance between the lines remains same then field is uniform and if the distance between the line does not remain same then the field is non unif-

Uniform field	Non uniform field	
-		

Example: A non-uniform electric field is shown in the figure then at which of the following point electric field is maximum

(a)A 🗸 (b)B

(d) same at all points



Electric field:

The space around the charge in which its electric force acts on other charge is called

ELECTRIC FIELD STRENGTH/INTENSITY

Electric field intensity at any point is defined as electric force per unit charge placed at that

Electric field intensity is a vector quantity.

> SI unit = $NC^{-1} = Vm^{-1}$, unit in terms of base units = $kgms^{-3}A^{-1}$,

 \triangleright Dimensions = $[MLT^{-3}A^{-1}]$

Electric force: Force acting on a charge 'q' in an electric field \vec{E} is

Electric force on a charge only depends upon magnitude of charge and electric field.

Electric force is independent of mass, velocity or direction of motion of charged particle. Electric force on positive charge is always parallel to electric field. Electric force on negative charge is always anti-parallel to electric field.

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Effect of medium:

> Presence of dielectric medium (insulator) always reduces the electric force between the charges by a factor ϵ_r .

(اگر کوئی دو Quantities معلوم ہول تواس relation ہے تیسری کو معلوم کریں)

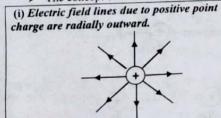
→ Relative permittivity → Dielectric constant → Dielectric coefficient

- $\epsilon_{\rm r}$ is constant for given material and different for different materials.
- Value of ϵ_r is always greater than or equal to one for vaccume: $\epsilon_r = 1$, for insulating materials $\epsilon_r > 1$, For metals: $\epsilon_o = \infty$
- \triangleright ϵ_r has no units, no dimensions.

· Material	Er	Material	\in_{r}
	1.0006	Ammonia Liquid	22-25
Air	5-18	Germanium	16
Bakelite	4.8-10	Paraffined paper	2
Glass	2.94	Teflon	
Rubber Transformer oil	2.74	Water	78.5

Electric Field Lines

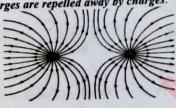
- Lines which provide information about strength and direction of electric field are called electric field lines.
- > The concept of field lines was introduced by Michael Faraday.



(ii) Electric field lines due to negative point charge are radially inward.



(iii) Electric field lines due to two similar charges are repelled away by charges.



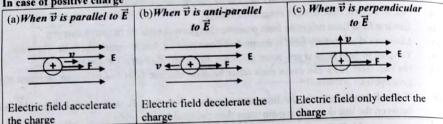
(iv) Electric field lines due to two opposite charges are pulled towards charges.

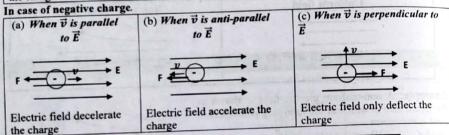


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> Electric force can accelerate, decelerate and deflect the charge particle.

In case of positive charge





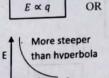
FIEL INTENSITY DUE TO POINT CHARGE

Electric field intensity due to point charge at any distance r is given as



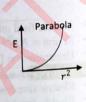
 $E \propto \frac{1}{r^2}$

It only depends upon charge, distance from the charge And nature of the dielectric medium









Effect of Medium:

Presence of dielectric medium always reduces the electric field intensity by factor \in_r times.

$$E_{med} = \frac{E_{vac}}{\epsilon_r} \qquad (Q$$

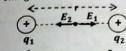
$$E_{med} = \frac{1}{4\pi\epsilon_o\epsilon_r} \frac{q}{r^2}$$

A L PRI P BOOK

By AZHAR IQBAL 0336-7098894

Zero Field Location:

When charges are similar, Let $(q_2 < q_1)$



جر جاري zero field على على similar كيد عاد يرك zero field

If
$$\vec{E} = \vec{E}_1 - \vec{E}_2 = 0$$
 then $E_1 = E_2$

ELECTROSTATICS

$$\Rightarrow \frac{kq_1}{r_1^2} = \frac{kq_2}{r_2^2} \Rightarrow \frac{r_1}{r_2} = \sqrt{\frac{q_1}{q_2}}$$

$$\Rightarrow \frac{kq_1}{r_1^2} = \frac{kq_2}{r_2^2} \Rightarrow \frac{r_1}{r_2} = \sqrt{\frac{q_1}{q_2}}$$

$$\Rightarrow \frac{r_1}{r_1^2} = \frac{kq_2}{r_2^2} \Rightarrow \frac{r_1}{r_2} = \sqrt{\frac{q_1}{q_2}}$$

$$\Rightarrow \mathbf{r}_1 = \frac{\mathbf{q}_2}{\mathbf{q}_1} + 1$$
 and $\mathbf{r}_2 = \frac{\mathbf{q}_1}{\mathbf{q}_2} + 1$

Where r_1 and r_2 are distances of zero field location from the charges q_1 and q_2 respectively

When charges are opposite, Let $(q_2 < q_1)$

جب چار Z side پر کری ایم والی zero field کریٹ پام والی sopposite کریٹ پام والی smaller پر گاور smaller پارٹ کے قریب ہوگا۔ \vec{E} اور smaller پارٹ کے قریب ہوگا۔ \vec{E} \vec{E}

If
$$\vec{E} = \vec{E}_1 - \vec{E}_2 = 0$$
 then $E_1 = E_2$

$$\Rightarrow \frac{kq_1}{r_1^2} = \frac{kq_2}{r_2^2} \Rightarrow \frac{r_1}{r_2} = \sqrt{\frac{q_1}{q_2}}$$

$$\Rightarrow r_1 = \frac{r}{\sqrt{\frac{q_2}{q_1} - 1}} \text{ and } r_2 = \frac{r}{\sqrt{\frac{q_1}{q_2} - 1}}$$

Where r_1 and r_2 are distances of zero field location from the charges q_1 and q_2 respectively

Examples: If $4\mu C$ and $16\mu C$ charges are separated by distance 3m. Then zero field location lies

- (a)1m from 16µC
- (b) 2m from 4µC
- (c) 1m from 4µC/
- (d) 4m from 4µC

Solution:

$$r_1 = \frac{1}{\sqrt{\frac{92}{q_1} + 1}}$$

$$r_1 = \frac{3}{\sqrt{\frac{16}{4} + 1}} = \frac{3}{2 + 1} = 1m$$

$$r_2 = 3 - 1 = 2m$$

Examples: If $1\mu C$ and $-4\mu C$ charges are separated by distance 3m. Then zero field location lies

- (a)1m from -4μC (c) 3m from 1µC√
- (b) 3m from -4μC
- (d) 6m from 1µC

Solution:

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$$r_1 = \frac{r}{\sqrt{\frac{92}{q_1} - 1}}$$

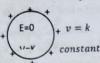
$$r_1 = \frac{3}{\sqrt{\frac{4}{1} - 1}} = \frac{3}{2 - 1} = 3m$$

$$r_2 = 3 + 3 = 6m$$

AMDCAT PREP BOOK

ELECTRIC FIEL INTENSITY FOR DIFFERENT CHARGE DISTRIBUTION

- Charge conducting sphere (or shell of charge)
 - Electric field inside the hollow charged sphere is zero.
 - Outside the sphere hollow charged sphere behave like a point charge.
 - Electric potential inside the sphere is constant.





جي region ي جي electric field يرومو كا region روگا۔

Inside the sphere or shell $(r < R)$	On surface of sphere or shell $(r = R)$	On surface of sphere or shell $(r > R)$
E=0	$E = \frac{kq}{R^2}$	$E = \frac{kq}{r^2}$

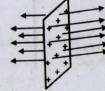
To eliminate the stray of Electric field interference sensitive electronic devices such as T.V or computer are often enclosed in metal boxes

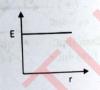
- (ii) Infinite sheet of charge:
 - > Electric field intensity due to infinite sheet of charge is independent of distance from the sheet. For example at point A and B electric field is same.



2Ae

OR





- (ii) Between two closely spaced and oppositely charged plates (capacitor):
 - Electric field intensity between two oppositely charged plates is also independent of distance.

$$E = \frac{\sigma}{\epsilon_o}$$

OR







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Flectric Potential: (Absolute Potential)

Electric potential at any point is defined as work done in bringing a unit positive charge from infinity to that point while keeping the charge in equilibrium.

$$V = \frac{W}{q_0}$$

UNIT 06

- > Potential is scalar quantity. > SI unit = volt = $\int C^{-1} = kgm^2s^{-3}A^{-1}$, Dimensions = $[ML^2T^{-3}A^{-1}]$

Potential difference:

Potential difference between two points is defined as work done in bringing a unit positive charge from one point to another while keeping the charge in equilibrium.

$$V_A - V_B = \frac{W}{q_o}$$

$$\Delta V = \frac{W}{q_o}$$

Work done on the charge:

When a particle of charge q and mass m nasses through P.d V then work done on it is given as

$$W = qV$$

- \triangleright $W \propto q$ and $W \propto V$
- W is independent of mass of particle

Gain in speed:

The gain in speed of particle when it is accelerated by P.d V is given as

$$v = \sqrt{\frac{2qV}{m}} > v \propto \sqrt{q}$$

$$> v \propto \sqrt{V}$$

$$> v \propto \frac{1}{\sqrt{q}}$$

Change in kinetic energy:

When a particle of charge q and mass mpasses through P.d, V then change in K.E is



- $\Delta K. E \propto q$ and $\Delta K. E \propto V$
- ΔK. E is independent of mass of

Change in potential energy:

When a particle of charge q and mass m passes through P.d, V then change in P.E is given as

$$\Delta P.E = qV$$

- $\Delta P.E \propto q$ and $\Delta P.E \propto V$
- $\Delta P. E$ is independent of mass of

Gain in momentum

The gain in momentum of a particle when it is accelerated through P.d V is given as

$$p = \sqrt{2mqV} \Rightarrow p \propto \sqrt{m}$$
$$\Rightarrow p \propto \sqrt{q}$$
$$\Rightarrow p \propto \sqrt{V}$$

Example:

If an electron and a proton are accelerated through same P.d then which of the following statement is true

- (a) both will gain equal K.E
- (b) electron will gain greater speed
- (c) proton will gain greater momentum
- (d) all of these ✓

AT PREP BOOF

Example:

If an electron and a proton are accelerated through same P.d then which one will gain greater momentum

(a) Electron

(b) Proton

(c) Both gain same (d) None

Solution: As $m_p > m_e$ and $P \propto \sqrt{m}$ So proton will gain

greater momentum.

Potential Gradient

- \rightarrow The quantity $\left(\frac{\Delta V}{\Delta r}\right)$ which gives the maximum rate of change of potential Δr with distance is called potential gradient.
- > Its SI unit is $Vm^{-1} = NC^{-1} = kgms^{-3}A^{-1}$
- > Electric field intensity and potential gradient have same units.
- > Potential gradient is a vector quantity.
- If electric field in a given region is zero then electric potential in this region is constant
- If electric field is constant it means that electric potential is changing at constant rate in this region

If V is P.d between two points

magnitude of electric field between

quantities ob de de E,V/1)

مول آوال relation سے تیسری کو معلوم کریں)

separated by distance d then

the points is

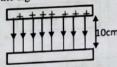
Relation with electric field

> Electric field is equal to -ve potential gradient.

$$\vec{E} = -\frac{\Delta V}{\Delta r}$$

- \triangleright If $E = 0 \Rightarrow \Delta V = 0$ and V = constant
- $If V = constant then \Delta V = 0 \Rightarrow E = 0$
- > In direction of electric field potential decreases.
- In opposite direction of electric field potential
- > In perpendicular direction of electric field potential remains same.

Example: P.d. between two oppositely charged parallel plates is 12V as shown in the figure then electric field between the plates will be



(a) $1.2NC^{-1}$ (b) $12NC^{-1}$

(c) $120NC^{-1}$

(d) Zero

Example: P.d. between two oppositely charged parallel plates is 12V as shown in the figure then electric field between the plates will be



- (a) Potential is maximum at B (b) Potential is minimum at A
- (c) Potential is same at C & D (d) All of these

Solution:

$$E = \frac{V}{d}$$

$$= \frac{12}{10 \times 10^{-2}}$$

 $= 120NC^{-1}$

Solution:

Correct option is d In direction of electric field potential decreases but in perpendicular direction potential remains constant.

ELECTRIC POTENTIAL DUE TO POINT CHARGE

Electric potential at any distance r due to a point charge q is given as





UNIT 06



Note

Potential due to +ve charge is +ve Potential due to -ve charge is -ve

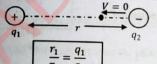
> In presence of dielectric medium potential decreases by ϵ_r times

$$V_{med} = \frac{V_{vac}}{\epsilon_r}$$

$$V_{med} = \frac{1}{4\pi\epsilon_o \epsilon_r} \frac{q}{r}$$

Zero Potential Location

a) When charges are opposite (let $q_2 < q_1$)



ہور سی اگر چار بر Zero Potential ہوار ترک ایٹ چار برے در میان ہو گا اور smaller چار ج کے قریب ہو گا۔

Distance of zero potential point from first charge

$$r_1 = \frac{q_1 r}{q_1 + q_2}$$

Distance of zero potential point from second

Example: Potential at a point midway between two equal and opposite charges is Solution:

$$q$$
 $V = 0$ $-q$

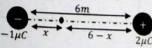
$$\frac{kq}{r}$$
 (b) $\frac{2kq}{r}$

$$= 0 \qquad -6$$

$$= \frac{kq}{r} - \frac{kq}{r}$$
$$= 0$$

 $V = V_+ + V_-$

Example: If $-1\mu C$ and $2\mu C$ charges are separated by distance 6m then find the position of point where potential is zero



(a) 2m from $-1\mu C$ (c)1m from $-1\mu C$

(b)2m from 2µC

(d)1m from 2µC

Solution:

$$x = \frac{q_1 r}{q_1 + q_2}$$
$$x = \frac{1 \times 6}{1 + 2} = 2m$$

zero potential point lies 2m from -1µC charge and 4m from 2µC charge

AT PRIP BOOK

b) When charges are similar (both are +ve or both are -ve) then zero potential point lies are infinity.

Electro Cardio Graphy:(ECG)

An ECG records the voltages between points on human skin generated by heart and it provide information about the performance of heart.

Electroencephelography:(EEG)

An EEG records the potential difference created by brain and provide information about for abnormal behavior.

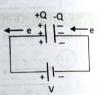
Electroretinoraphy:(ERG)

An ERG records the potential difference generated by retina

CAPACITOR

Capacitor is a device which can store electric charge.

- When battery is connected across the plates of parallel plate capacitor, battery removes electrons from one plate and transfers electrons to other plate.
- > Capacitor continue charging until its P.d becomes equal to P.d of the battery.
- Net charge on a capacitor is always zero.



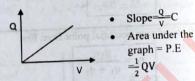
graph = P.E

 $=\frac{1}{2}QV$

Charge on the capacitor is directly proportional to P.d across the plates of capacitor.

$$Q \propto V$$
 OR $Q = 0$

Where C is proportionality constant known as capacitance.



Electric field intensity between plates of capacitor is

$$E = \frac{\sigma}{\epsilon_o \epsilon_r} = \frac{Q}{A \epsilon_o \epsilon_r}$$

Relation between electric field and P.d across the capacitor is

$$E = \frac{V}{d}$$

Electric force between the plates of capacitor is given as

$$F = QE$$

$$F = Q\left(\frac{Q}{2A\epsilon_0\epsilon_r}\right)$$

$$F = \frac{Q^2}{2A\epsilon_0\epsilon_r}$$

By AZHAR IQBAL 0336-7098894

CAPACITANCE

ELECTROSTATICS

Capacitance of parallel plate capacitor is defined as amount of charge on one plate necessary to raise its potential by one volt w.r.t. other plate.

$$C = \frac{Q}{V}$$

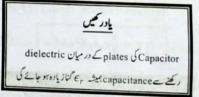
- > SI unit of capacitance is farad.
- $F = CV^{-1} = kg^{-1}m^{-2}s^4A^{-2}$ (Dimensions = $[M^{-1}L^{-2}T^4A^{-2}]$)
- > Capacitance of parallel plate capacitor is given as

$$C_{med} = \frac{A\epsilon_o\epsilon_r}{d} \quad OR$$

$$C_{vac} = \frac{A\epsilon_o}{d}$$

It only depends upon three factors. (i). Area of the plates C ∝ A.

- Distance between the plates $C \propto \frac{1}{4}$
- (iii) Medium between the plates $C \propto \epsilon_r$



Note

C is proportionality constant and it is

independent of Q and V

Examples:

If length, width and thickness of plates of a capacitor are doubled then its capacitance will become

- (a) Double (c) Eight Times
- (b) Four Times
- (d) Remains same

Solution Since C is independent of thickness and $C \propto A \Rightarrow C \propto length \times width$ Hence capacitance becomes four times.

Dielectric Constance:

The ratio of capacitance of parallel plate capacitor when dielectric is as medium between the plates to capacitance of parallel plate capacitor when vacuum is medium between the plates.

$$\epsilon_r = \frac{C_{med}}{C_{vac}}$$

- Since $C_{med} > C_{vac} \implies \epsilon_r > 1$
- · It only depends on nature of the medium
- Its value is always greater or equal to one
- · It has no unit no dimensions

ADCAT PREP BOOF

Energy Stored in Capacitor:

- > Capacitor is a device which can store the charge, alternatively capacitor is a device which can store electrical energy.
- > Charge stored on plates of capacitor posses electrical P.E arises due to work done by battery to deposite charge on the plates.
- > P.E stored on the plates of capacitor is given as

i.
$$P.E = \frac{1}{2}QV$$

ii.
$$P.E = \frac{1}{2}CV^2$$

iii.
$$P. E = \frac{Q^2}{2C}$$

- کونا relation کب question کرناہے ا ری ک depend information کرے
- > Energy stored in the capacitor can be regarded that energy is stored in form of electric field between the plates instead of P.E of the charges on the plates.

$$P.E = \frac{1}{2}\epsilon_o\epsilon_r E^2(Ad)$$

And

Energy density =
$$\frac{1}{2}\epsilon_o\epsilon_r E^2$$

Three Important cases for capacitor

If battery remains connected across capacitor or capacitors are connected in parallel then V = constant

$$Q = CV$$

$$\frac{Q_1}{Q_2} = \frac{C_1}{C_2}$$

$$P.E = \frac{1}{2}CV^2$$

$$\Rightarrow P.E \propto C$$

$$\frac{P.E_1}{P.E_2} = \frac{C_1}{C_2}$$

Example:

A capacitor is connected across a 12V battery. If a dielectric medium is introduced between the plates then which of the following statement is true.

- (a) Capacitance increases (b)Charge increases
- (c) Energy increases
- (d) All of these

Solution:

As V = constant so $Q \propto C$ and $P.E \propto C$ By introducing dielectric C increases so Q and P.E also increases.

Example:

If $4\mu F$ and $6\mu F$ capacitor are connected in parallel that the ratio between charge stored in capacitor and energy stored in capacitor will be

- (a) 2:3 and 2:3 (c) 3:2 and 3:2
- (b) 2:3 and 3:2 (d) 3: 2 and 2:3

Solution

:Since V = constant.

MDCAT PREP BOOK

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If battery is not connected to capacitor (isolated capacitor) or capacitor are connected in series then Q = constant

$$Q = CV \qquad \Rightarrow \qquad V \propto \frac{1}{C}$$

$$\frac{V_1}{V_2} = \frac{C_2}{C_1}$$

$$P.E = \frac{Q^2}{2C}$$

$$\Rightarrow P.E \propto \frac{1}{c} \quad and \quad \frac{P}{P}$$

Example: If distance between the plates of a charged Solution capacitor is doubled then energy stored in capacitor will As Q = constantbecome

- (a) Double
- (b) Half
- (c) Four Times
- (d) Remains same

so P. E $\propto \frac{1}{C}$ and $C \propto \frac{1}{C}$

by doubling distance C becomes half thus energy

becomes double

Example: If $C_1 = 2\mu F$ and $C_2 = 4\mu F$ are connected in | Solution: As Q = constantseries then ratio between their voltages will be

(a) 1:1 (c) 2:1

- (b) 1:2
- (d) 1:4

so $V \propto \frac{1}{c}$

$$As \frac{c_1}{c_2} = \frac{1}{2} \implies \frac{v_1}{v_2} = \frac{2}{1}$$

3. If area of plates distance between the plates and medium between the plates are not changed then C = constant

As
$$Q = CV$$
 \Rightarrow $Q \propto V$ or $\frac{Q_1}{Q_2} = \frac{V_1}{V_2}$ and $P.E = \frac{1}{2}CV^2$ \Rightarrow $P.E \propto V^2$

Example: If voltage across capacitor is doubled then Solution: As C = constantenergy stored in capacitor will becomes

(a) Double

(c) Four Times

- (b) Half
- (d) Remains same

 $P.E = \frac{1}{2}CV^2 \Rightarrow P.E \propto V^2$ If V is doubled then energy will become four times

SERIES COMBINATION OF CAPACITORS

If capacitors end to end such that same charge is stored across all of them then this combination is known as series combination.

(Lunczy capacitors funconnected は path いし(capacitors が)

Example 1

AT PREP BOOK

> When capacitors are connected in series charge on each capacitor is same

$$Q_1 = Q_2 = Q$$
 (Total charge)

$$\Rightarrow \boxed{\frac{Q_1}{Q_2} = 1}$$

$$Q_1=Q_2=C_{eq}V$$
 $Q_1=Q_2=C_{eq}V$ علوم کری) $Q_1=Q_2=C_{eq}V$ عطوم کری)

When capacitors are connected in series, total voltage is divided among the capacitors.

$$V = V_1 + V_2$$

As Q is same so



(جر کی capacitance فرومو گیاس کے accross والتحزياده Drop موكا)

Voltage Divider Rule:

If two capacitors are connected in series with voltage V as shown in figure

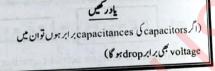
$$\frac{V_1}{V_2} = \frac{C_2}{C_1}$$





Voltage drop across the capacitor C1 and C2 is given as

$$V_1 = \frac{C_2}{C_1 + C_2} V$$



As Q is same so $P.E = \frac{Q^2}{2C} \Rightarrow P.E \propto \frac{1}{C}$ (Greatore 3.7) L'appacitance (C?)

Equivalent Capacitance:

If 'n' number of capacitors are connected in series

- $C_{eq} = \frac{C}{n}$ (capacitors $\sqrt{\frac{1}{2}}$ capacitors $\sqrt{\frac{1}{2}}$ capacitors $\sqrt{\frac{1}{2}}$ capacitors $\sqrt{\frac{1}{2}}$
- Oscapacitor Lindifferent values ()) Product of capacitances تواس فار مولے کوuse کریں) C_1C_2 2. Sum of capacitances

(اگرزیاده capacitor کا svalues different استار مول

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4. Cea < Cmin

ری کے آئے گا کے capacitance کے میں کم آئے گا C_{eq}

5. To decrease the capacitance capacitors are connected in series.

Example:

If two capacitors $C_1 = 4\mu F$ and $C_2 = 6\mu F$ are connected in series with a 12V battery as shown



i. $C_{eq} = \frac{C_1 C_2}{C_1 + C_2} = \frac{4 \times 6}{4 + 6} = \frac{24}{10} = 2.4 \mu F$

ii. $Q_1 = Q_2 = Q = C_{eq}V = 2.4 \times 12\mu C =$

28.8 μ C and $\frac{Q_1}{Q_2} = 1$ iii. $V_1 = \frac{C_2}{C_1 + C_2}V = \frac{6}{4+6} \times 12 = 7.2V$

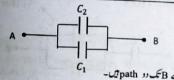
iv. $V_2 = \frac{c_2}{c_1 + c_2} V = \frac{4}{4 + 6} \times 12 =$

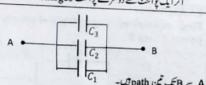
4.8V and $\frac{V_1}{V_2} = \frac{C_2}{C_1} = \frac{3}{2}$ v. $V_1 + V_2 = 7.2 + 4.8 = 12V = V$

COMBINATION OF CAPACITORS

If capacitors are connected are connected side by side such that same potential difference is applied across all of them then this combination is known as parallel combination.

اگرایک پوائٹ سے دوسرے پوائٹ charges گزرنے کے لیے ایک سے زیادہ path ہوں تو capacitors آپس میں parallel میں ہوں کے





➤ When capacitors are connected in parallel then voltage across each capacitor is same

$$V_1 = V_2 = V$$
 And $\frac{V_1}{V_2} = 1$

When capacitors are connected in parallel total charge is divided among the capacitors $Q = Q_1 + Q_2$

As V is same so

QxC P. E & C

and

and

(جى كى capacitance زياده كى اس پر زياده چار عاد عاد كا)

(جری capacitance ایدو کاس برزیاده اندی store کی اس برزیاده اندی

Charge divider Rule

If two capacitors are connected in parallel then total charge Q is divided among them as

$$Q_1 = \frac{C_1}{C_1 + C_2} Q$$
 and $Q_2 = \frac{C_2}{C_1 + C_2} Q$

As V is same and P.E = $\frac{1}{2}CV^2$ so

(جس كا capacitance زياده توكي اس مين زياده از جي capacitance وكي ا

Equivalent Capacitance:

then

الب م بيل ديكسي اگر capacitors are connected in parallel يوز same كويليوز capacitors are connected in parallel capacitance کو تعدادے multiply کردیں)

$$C_{eq} = C_1 + C_2 + C_3 + \dots + C_n$$

(اگرcapacitors و العام different values بول توسب

(دي) sumb capacitances

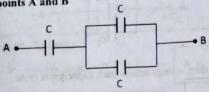
 C_1 (parallel)

- > Ceq > Cmax
- > To increase the capacitance capacitors are connected in parallel.

PRACTICE EXAPLES

EXAMPLE1:

Find equivalent capacitance between the points A and B

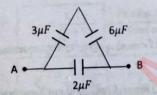


SOLUTION:

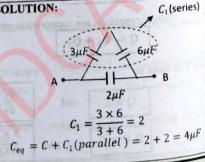


EXAMPLE2:

Find equivalent capacitance between the points A and B



SOLUTION:

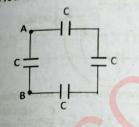


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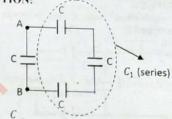


UNIT 06 EXAMPLE3: Find equivalent capacitance between the points A and B



SOLUTION:

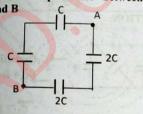
ELECTROSTATICS



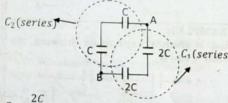
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 $C_1 = \frac{1}{3}$ (capacitors have same value) $C_{eq} = C + C_1(parallel) = C + \frac{C}{3} = \frac{4C}{3}$

EXAMPLE4: Find equivalent capacitance between the points A and B

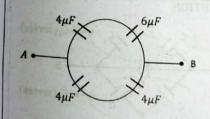


SOLUTION:

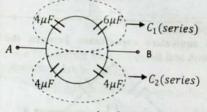


 $C_1 = \frac{c}{2}$ (capacitors have same value) $C_{eq} = C + \frac{C}{2}(parallel) = \frac{3C}{2}$

EXAMPLES. Find equivalent capacitance between the points A and B



SOLUTION:



 $C_1 = \frac{4 \times 6}{4 + 6} = 2.4$ $C_2 = \frac{4\mu F}{2} (capacitors have same value)$ $C_{eq} = C_1 + C_2 = 2 + 2.4 = 4.4 \, \mu F$

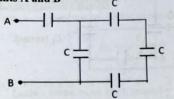


ELECTROSTATICS

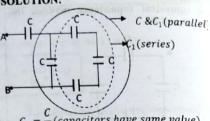
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EXAMPLE6:

Find equivalent capacitance between the points A and B



SOLUTION:



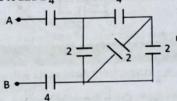
$$C_1 = \frac{C}{3} (capacitors have same value)$$

$$C_2 = C + C_1 = C + \frac{C}{3} = \frac{4C}{3}$$

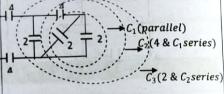
$$C_{eq} = \frac{C \times \frac{4C}{3}}{C + \frac{4C}{3}} = \frac{4C}{7}$$

EXAMPLE7:

Find equivalent capacitance between the points A and B4



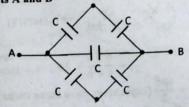
SOLUTION:



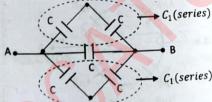
$$C_1 = 2 + 2 = 4$$
 $C_2 = \frac{4}{2} = 2 (same \ values)$
 $C_3 = 2 + 2 = 4$
 $C_{eq} = \frac{4}{3}$

EXAMPLE6:

Find equivalent capacitance between the points A and B



SOLUTION



 $C_1 = \frac{1}{2}$ (capacitors have same value)

 $C_2 = \frac{1}{2}$ (capacitors have same value)

$$C_{eq} = C + \frac{C}{2} + \frac{C}{2} = 2C$$

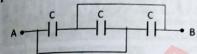
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EXAMPLE6:

Find equivalent capacitance between the points A and B



SOLUTION

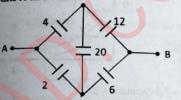
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There are three path from A to B hence three capacitors are in parallel

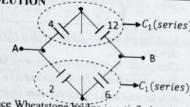
$$C_{eq} = \frac{C}{3} (capacitors have same value)$$

EXAMPLE6:

Find equivalent capacitance between the points A and B



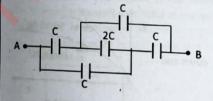
SOLUTION

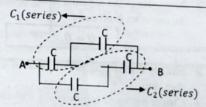


Since Wheatstone bridge is satisfied so 20F

capacitance can be deleted
$$C_1 = \frac{4 \times 12}{4 + 12} = 3 \text{ and } C_2 = \frac{2 \times 6}{2 + 6} = 1.5$$

$$C_{eq} = 3 + 1.5 = 4.5$$





Since Wheatstone bridge is satisfied so 2C capacitance can be deleted

$$C_1 = \frac{c}{2}$$
 (capacitors have same value)
 $C_2 = \frac{c}{2}$ (capacitors have same value)

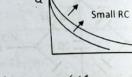
$$C_{eq} = \frac{C}{2} + \frac{C}{2} = C$$



CHARGING AND DISCHARGING OF CAPACITORS

Charging of capacitor:

- > To charge the capacitor, capacitor is connected with a voltage source(battery) as shown in the figure below
- > Charging of a capacitor continues until the potential difference of capacitor becomes equal to the potential difference of source.
- > At any instant the charge on the plates of capacitor is
 - $Q = Q_o \left(1 e^{-t/RC} \right)$
- > With the passage of time charging of capacitor
- > Charge increases exponentially with time
- Time constant: Time required by a capacitor to deposit 0.63 or 63% equilibrium charge.



t = RC

اگر کوئی دو Quantities دی گئی ہوں تواس relation تیری معلوم کریں

Unit: It's unit is second

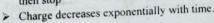
Large RC

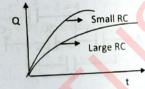
Discharging of Capacitor:

> To discharge the capacitor at any instant 't' charge on the capacitor is given as

$$Q = Q_o e^{-t/RC}$$

> Initially discharging is fast, later on it slow down and then stop





Large RC

Time required to discharge 0.63 or 0.63% of equilibrium charge is called time constant.

$$t = RC$$

اگر کوئی دو Quantities وی می مول تواس relation تیری معلوم کریں

- Unit of RC is second ohm × forced = sec
- \triangleright After time equal to time constant (t = RC), 63% capacitor is discharged and remaining charge on the capacitor is 37%

The charging and discharging of a capacitor enables some windshield wipers of cars to be used intermittently during a light drizzle in this mode of operation the wipers remain off for a while and turn on briefly. The timing of on-off cycle is determined by time constant of visitor-capacitor combination.

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CURRENT ELECTRICITY

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UNIT 07

INIT 07 >> CURRENT ELECTRICITY

ELECTRIC CURRENT:

- > Rate of flow of charge is called electric current or charge passing through cross section area of the conductor per unit time is called current.
- > Average current is given as



Voltage بر coulomb چارج کی از جی کو ظاہر کر تا ہے۔ Current بر سيند من گذرنے والے جار جزكي تعد او كو ظاہر كرتا ہے-

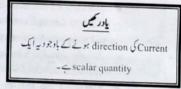
> Slope of Q-t graph represent the current







- > Current is a scalar quantity.
- Current is a base quantity and its SI unit is ampere $(A = Cs^{-1})$
- > Current is one ampere if one coulomb charge is passing through conductor in one second
- > If 'n' is number of electrons (or protons) passing through a point in time t then Q = ne and average current is





Note

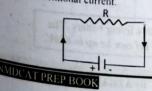
One ampere current means 6.25×10^{18} electrons are passing through a conductor in one second

Charge Carriers:

•	Semi-conductors
Ions and free e	Free electrons and holes
	lons and free e

Conventional Current:

Equivalent current due to flow of positive charge carriers from high potential to low potential is called conventional current.



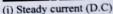
Electronic current:

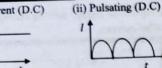
Current due to flow of electrons (negative charge carriers) from low potential to high potential is called electronic current



135

Other Types of Current:



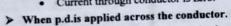


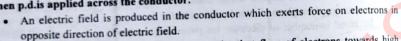
(iii) Alternating Current (A.C)



Current though metallic conductor:

- In metallic conductors charge carriers are free electrons.
- > Free electrons are in state of random motion like gas molecules, electrons collide with each other and with lattice atoms and thus they change their direction.
- ➤ Thermal velocity of electrons is several 100 km/s
- > When no potential difference is applied across conductor
 - Average velocity of electrons is zero.
 - · Net flow of electrons is zero.
 - Current through conductor is zero.





- · Electrons are still in state of random motion but flow of electrons towards high potential (+ve) is greater than flow of electrons towards low potential (-ve) and thus net flow is not zero.
- Electrons are drifted towards high potential and an electric current passes through conductor.

Drift velocity:

Average velocity gained by electrons when a potential difference is applied across the conductor is called drift velocity.

- ➤ Drift velocity is of the order of 10⁻³m/s or 1mms⁻¹
- ➤ Drift velocity of electrons is always opposite to direction of electric field.





(n is number of charge carriers per unit volume)

Information: When eel senses danger ,it turns itself into a living battery .The potential difference between head and tail of an electric eel can be up to 600V.

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CURRENT ELECTRICITY

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UNIT 07 Source of current:

A device which maintains a constant Potential difference across the two ends of a conductor is called source of current. Source of current converts some nonelectrical energy into electrical energy.

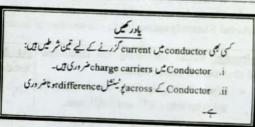
Ideal current source:

A current source which maintains a constant current irrespective of load resistance is called ideal current source. Its internal resistance is infinite

Source of current	Cell / Battery	Generator	Thermocouple	Solar cell
Converts	Chemical	Mechanical	Heat energy	Light energy
	energy into	energy into	into electrical	into electrical
	electrical energy	electrical energy	energy	energy

Ideal voltage source:

A voltage source whose output voltage is independent of current drawn from it is called ideal voltage source. Its internal resistance is zero.



EFFECTS OF CURRENT

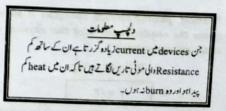
Heating effect:

- > Current passing through a conductor produces heat in the conductor.
- ➤ When current passes through conductor electrons collide with atoms and transfer some energy to atoms thus average K.E of atoms increases and temperature of conductor increases.
- > Applications: Electric heater, electric stove, electric kettle, electric iron, filament

Joule's law of heating:

When current I is passing through conductor of resistance R for time t then heat produced in conductor is given as

 $H = I^2 Rt$



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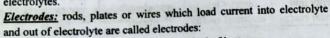
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Magnetic effect:

- > Current produces through the conductor produces magnetic field around the
- > Strength of magnetic field depends upon amount of current.
- > Pattern of magnetic field depends upon shape of conductor.
- > Applications: Voltmeter, ammeter, galvanometer, motors, electromagnets, speaker

Chemical effect:

Current passing through electrolyte produces chemical changes in it. Electrolytes: liquids which can conduct electricity are called electrolytes.



Anode: Electrode connected to +ve terminal of battery.

Cathode: Electrode connected to -ve terminal of battery



Voltmeter: vessel containing the electrolyte and electrodes is called voltmeter.

• When CuSO4 is dissolved in water it splits up into Cu^{+2} and SO_4^{-2} ions.

$$CuSO_4 \longrightarrow Cu^{+2} + SO_4^{-2}$$

At Cathode: Cu+2 ions move towards the cathode and get deposit there

$$Cu^{+2} + 2e^{-} \longrightarrow Cu$$

At Anode: SO₄⁻² ions move towards the anode and remove one cell atom of anode.

$$SO_4^{-2} + Cu \longrightarrow CuSO_4 + 2e^-$$

Electroplating: Process of coating a thin layer of some expensive metal on an article of cheap metal is called electroplating.

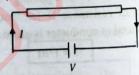
OHM'S LAW

"Current passing through conductor is directly proportional to potential difference applied across the conductor provided that physical conditions (Area, length, volume, temperature, strain etc) are constant"

$$I \propto V \quad or \quad I = \frac{V}{R}$$

$$\Rightarrow \qquad V = IR$$

Where R is constant and known as resistance of conductor.



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UNIT 07 Resistance:

Resistance is measure of opposition in the flow of electrons due to their continuous bumping with atoms of the lattice.

Resistance of a conductor is independent of applied voltage and current passing through the circuit.

- > SI unit of resistance is ohm $\left(ohm = \frac{volt}{ampere}\right)$
- > Resistance is one ohm if one ampere current passes through conductor in one second.

CURRENT ELECTRICITY

▶ In terms of base units the unit of resistance is $kam^2s^{-3}A^{-2}$ $(dimensions = [ML^2T^{-3}A^{-2}])$

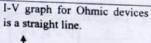
Ohmic Devices:

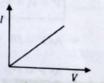
Devices which obey the Ohm's law are called ohmic devices.

· Conductance is reciprocal of resistance

$$Conductance = \frac{1}{resistance}$$

- Resistance and conductance of an ohmic device remains
- Resistors and metallic wires for constant temperature are ohmic.





Slope of I-V graph represents the conductance.

Non-Ohmic Devices:

- > Devices which do not obey Ohm's law are called non-ohmic devices.
- > I-V graph for non-ohmic devices is not a straight line (non-linear).
- Slope of I-V graph represent the conductance.
- Resistance and conductance of a non-ohmic device does not remains constant.
- Filament bulb, diodes, discharge tubes, transistors, capacitors, inductor etc. are non-ohmic

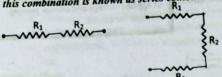


Semiconductor Diode:



. Series combination:

If resistors are connected end to end such that same current is passing through all of them this combination is known as series combination.





(Luncz resistors Junconnected of path Garesistors Si)

- > Current passing through each resistor is $I_1 = I_2 = I$
- (کی بھی resistor ہے گزرنے والا current معلوم کرنے کے لیے میلے

> Voltage is divided among the resistors

$$V = V_1 + V_2$$

* As V = IR > V \(\alpha\) (& \(\text{drop object across voltage } \(\subset \text{U \(\text{S roly iresistance } \(\text{U} \))

$$\star$$
 As $P = I^2 R \Rightarrow P \propto R$

(جس کی resistance کاریده موگی اس ش Power می زیاده فری موگی)

Voltage Divider Rule

If two resistance R₁ and R₂ are in series with voltage V then

$$V_1 = \frac{R_1}{R_1 + R_2} V$$
 and
$$V_2 = \frac{R_2}{R_1 + R_2} V$$

Example: Two resistances $R_1 = 2\Omega$ and $R_2 = 4\Omega$ are connected in Solution: $V_2 = \frac{R_2}{R_1 + R_2}V$ series with a 12V battery then voltage drop across 4Ω resistor will be $=\frac{4}{4+2} \times 12 = 8V$ (b) 4V (a) 2V

Equivalent Resistance:

If 'n' number of resistors are connected in series then

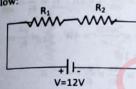
- (اگرب سے پہلے دیکھیں کہ resistance برابر ہیں تو resistance کو تعدادے multiply کردی)
- $R_{eq} = R_1 + R_2 + \dots + R_n$ (sumb resistances resistance) syralues
- 3. $R_{eq} > R_{max}$
- 4. To increase the resistance, resistors are connected in series.

UNIT 07

CURRENT ELECTRICITY

Example:

If two resistors $R_1 = 2\Omega$ and $R_2 = 4\Omega$ are connected in series are as shown in the figure helow:



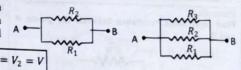
- 1. $Req = R_1 + R_2 = 2 + 4 = 6\Omega$
- 2. $I = I_1 = I_2 = \frac{V}{Reg} = \frac{12}{6} = 2A$
- 3. $V_1 = \frac{R_1}{R_1 + R_2} V = \frac{2}{2+4} (12) = \frac{2}{6} (12) = 4V$
- 4. $V_2 = \frac{R_2}{R_1 + R_2} V = \frac{4}{2+4} (12) = \frac{4}{6} (12) = 8V$

- 7. $P_1 = I^2 R_1 = (2)^2 (2) = 4 \times 2 = 8W$

$P_2 = I^2 R_2 = (2)^2 (4) = 4 \times 4 = 16W$

Parallel Combination:

If resistors are connected side by side such that same P.d is applied across all of them then this combination is known as parallel combination.



- ➤ Voltage across each resistor is same. $V_1 = V_2 = V$ \triangleright Current is divided $I = I_1 + I_2$
 - * As $I = \frac{V}{R}$ $\Rightarrow I \propto \frac{1}{R}$ (% $\Rightarrow I \propto \frac{1}{R}$ (% $\Rightarrow I \propto \frac{1}{R}$ (% $\Rightarrow I \sim \frac{1}{R}$ $\Rightarrow P \propto \frac{1}{R}$ (% $\Rightarrow P \sim \frac{1}{R}$)

* As
$$P = \frac{V^2}{R}$$
 $\Rightarrow P \propto \frac{1}{R}$ (Green Fower of Unity resistance (Green)

Current Divider Rule:

If two resistors R_1 and R_2 are connected in parallel with total current I then current through each resistor is given as

$$I_1 = \frac{R_2}{R_1 + R_2} I$$
 and $I_2 = \frac{R_1}{R_1 + R_2}$

Equivalent Resistance:

If 'n' number of resistors are connected in series then

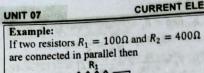
- 1. $R_{eq} = \frac{R}{n}$ (1) $R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{product\ of\ resistances}{sum\ of\ resistanc\ e}$ (2) $R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{product\ of\ resistances}{sum\ of\ resistanc\ e}$ (2) $R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{product\ of\ resistances}{sum\ of\ resistanc\ e}$

- 3. $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n} \left(\sqrt{2} \int use^{\int use^$
- 4. To decrease the resistance, resistors are connected in parallel.
- $R_{series} = n^2 R_{parallel}$

 R_{series} = Equivalent resistance when resistors are connected

 $R_{parallel}$ = Equivalent resistance when resistors are connected in parallel.

JIDCA FPREP BOOK



V=12V

CURRENT ELEC	TRICITY	
CORREIT	1. $Req = \frac{R_1 \times R_2}{R_1 + R_2}$:
	1. Key - P + P-	

	And the second	NO. O. C. LOURS		
		$R_1 \times R_2$	100 × 400	- 000
1.	Req	$=\frac{1}{R_1+R_2}$	500	=800

1.
$$Req = \frac{1}{R_1 + R_2} - \frac{1}{500}$$

2. $V_1 = V_2 = V = 20V$

2.
$$V_1 = V_2 = V = 20V$$

3. $I_1 = \frac{V}{R_1} = \frac{20}{100} = 0.2A$, $I_2 = \frac{V}{R_2} = \frac{20}{400} = 0.05A$

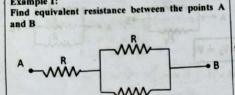
$$I_1 = \frac{v}{R_1} = \frac{20}{100} = 0.2A, \quad I_2 = \frac{v}{R_2} = \frac{20}{400} = 0.05A$$

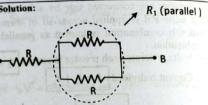
$$V^2 = \frac{20 \times 20}{20 \times 20} \quad \text{and} \quad D = \frac{V^2}{400} = \frac{1}{20}$$

4.
$$P_1 = \frac{V^2}{R_1} = \frac{20 \times 20}{100} = 4W$$
, $P_2 = \frac{V^2}{R_2} = \frac{V$

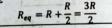
5.
$$\frac{I_1}{I_1} = \frac{R_2}{R_1} = \frac{400}{100} = \frac{4}{1}$$

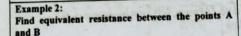
6.
$$\frac{V_1}{V_2} = \frac{R_1}{20} = 1$$

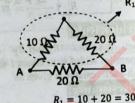


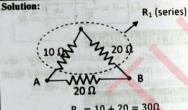


 $R_1 = \frac{\kappa}{2}$ (resistors have same values)

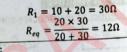


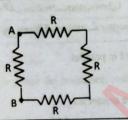


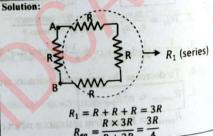




Example 3: Find equivalent resistance between the points A

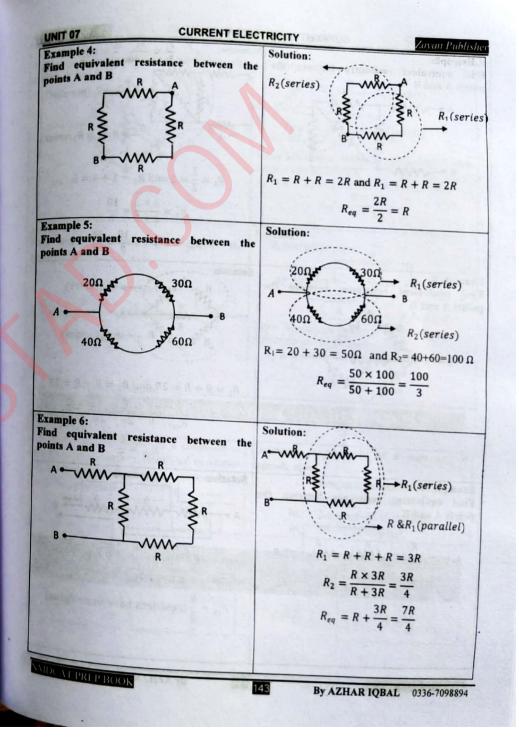


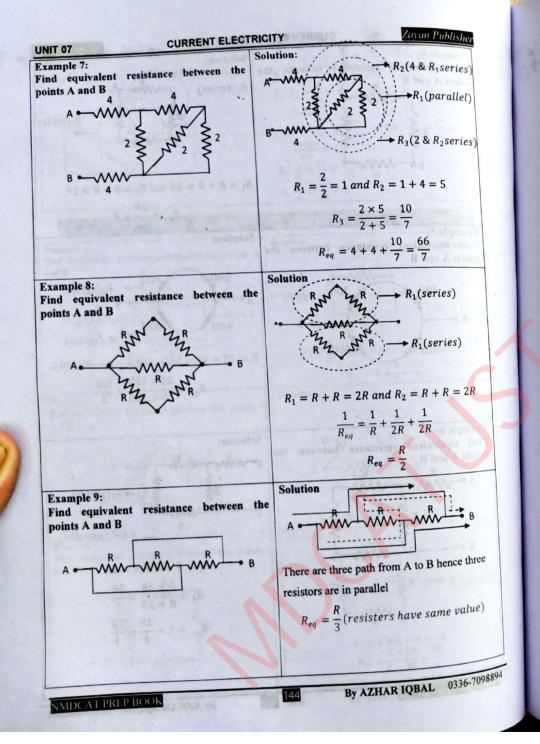


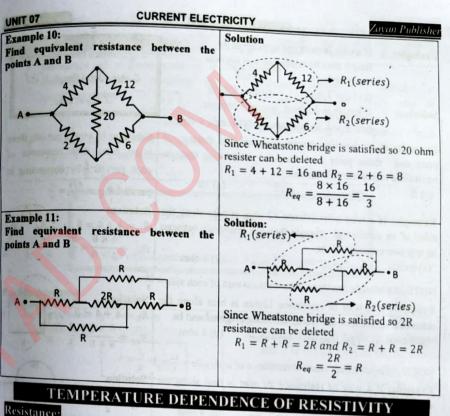


MDCAT PREP BOOK

and B







Resistance

It is found that resistance of a conductor is Resistance is property of a wire and it directly proportional to length of conductor and inversely proportional to cross-sectional area of the conductor

depends upon.

i. Length of conductor

Area of conductor

Temperature of conductor

Nature of material

Relation with length of wire	Relation with area of wire	Relation with radius of wire	Relation with diameter of wire
RαL	$R \propto \frac{L}{A}$	$R \propto \frac{1}{r^2}$	$R \propto \frac{1}{d^2}$

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Example:

If a wire is stretched to twice of its

length then its resistance will become

(a) Double

(b) Half

(c) Four Times

(d)One Fourth

Solution:

If length is doubled, area will become half $R \propto \frac{L}{A}$ so resistance will become 4-times

Example: If a wire of resistance R is cut into three equal parts and these parts are connected in parallel then its equivalent resistance will become

(a) R

 $(b)^{\frac{R}{2}}$

 $(c)\frac{R}{c}$

(d) 3R

Example: If a wire of resistance 12 ohm is bent along the Solution: sides of an equilateral triangle then the resistance between $R_1 = 4 + 4 = 8$ its any two vertices will be

(a) 6 ohm

(b) 4 ohm

 $(c)\frac{8}{3}$ ohm

(d) 4 ohm

NOTE: As triangle has three sides so resistance of each side =

Example: If a wire of resistance 120hm is bent along the | Solution: sides of a square then the resistance along diagonal will be $(b)_{3}^{4}$ ohm $(c)_{3}^{6}$ ohm $(d)_{4}^{4}$ ohm

(a) 6 ohm

$$R_1 = 4 + 4 = 8$$

$$R_{eq} = \frac{4 \times 8}{4 + 8} = \frac{8}{3}$$

ادر عی جب stretch & wire کرویں کے

زعة كنا length الماده الالمادة

- time

Solution: If wire is cut into three

equal parts then resistance of

each part is $\frac{R}{2}$ by connecting in

parallel $R_{eq} = \frac{R/3}{3} = \frac{R}{9}$

 $R_{eq} = \frac{4 \times 8}{4 + 8} = \frac{8}{3}$

NOTE: As square four sides so resistance of each side = $\frac{12}{4}$ = 3

Example: If a wire of resistance 20 ohm is bent along the circle then the resistance along diameter will be

(a) 6 ohm

(d) 4 ohm $(b)^{\frac{4}{3}}$ ohm $(c)^{\frac{8}{3}}$ ohm





Conductance:

conductance

➤ Unit of conductance is ohm⁻¹ or mho or simen

> Reciprocal of resistance is called Conductance is property of a wire and it depends upon.

Length of conductor

Area of conductor

Temperature of conductor

Nature of material

Relation with length of wire	Relation with area of wire	Relation with radius of wire	Relation with diameter of wire
$G \propto \frac{1}{L}$	$G \propto A$	$G \propto r^2$	$G \propto d^2$

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Resistivity or Specific Resistance:

- Resistance of a meter cube of a Dependence: material is called resistivity or specific resistance.
- SI unit of resistivity is ohm-m $(kgm^3s^{-3}A^{-2})$ and dimensions are $[ML^3T^{-3}A^{-2}]$
- Resistivity is property of material and it is independent of length, area or dimensions of conductor.
- Resistivity only depends upon temperature and nature of material.

Resistivity کے اور کی جی فار سولے میں المحقود کی المحق proportionality کانشٹ اس فار مولے کی باقی quantities نیس کر تا۔

Conductivity

UNIT 07

> Reciprocal of resistivity is called Dependence: conductivity.

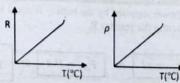
> Its SI unit $ohm^{-1}m^{-1}(kg^{-1}m^{-3}s^3A^2)$

- Conductivity is property of material and it is independent of length, area or dimensions of conductor.
- Conductivity only depends upon temperature and nature of material.

Temperature dependence:

By increasing temperature, average K.E of atoms increases due to which the amplitude of vibrations of atoms increases thus probability of collisions of electrons with atoms increasaes. Since resistance is due to collision of electrons with atoms hence resistivity or resistance of conductor increases by increasing temprature.

> Resistance or resistivity of metals increase linearly with temperature.



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Temperature Coefficient of Resistance

Fractional change in resistance per Kelvin is called temperature coefficient of resistance.

$$\alpha = \frac{R_t - R_o}{R_o t}$$

- ightharpoonup Its SI unit is K^{-1} .
- It only depends upon nature of material.
- For all metals (Cu, Al, Fe etc.) α is positive which means by increasing temperature their resistance increases (conductance decreases).
- For semi-conductors insulators and electrolytes (C, Si, Ge) α is negative which means by increasing temperature their resistance decreases (and conductance increases)

Temperature Coefficient of Resistivity:

Fractional change in resistivity per Kelvin is called temperature coefficient of resistivity.

$$\alpha = \frac{\rho_t - \rho_o}{\rho_o t}$$

> Its SI unit is K^{-1} .



Electrical Power

Electrical power:

"Energy supplied by cell or battery per unit time is called electrical power of the battery or cell."

$$P = \frac{Energy \ suppli \ ed}{Time}$$

or

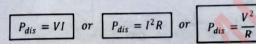
$$P = VI$$

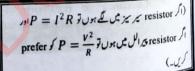
Cell

Charge Δq move from high potential to low potential and dissipates its energy across resistance R and comes to low potential. Battery supplies the energy to charge and move it from low potential to high potential.

Power dissipated across resistor:

Power supplied by the battery is equal to power dissipated across the resistor R





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UNIT 07

CURRENT ELECTRICITY

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Series Combination of Power:

If 'n' number of devices are connected in series then

1.
$$P_{eq} = \frac{P}{n}$$

(بے ہیل ویکسی اگر device کی ویلیوز same ای تو Power کو تعداد پر divide کریں۔)

2.
$$P_{eq} = \frac{P_1 P_2}{P_1 + P_2} = \frac{product \ of \ power}{sum \ of \ power}$$

(اگرود use ایم مولا sidevices کیا۔) مولا use کریں۔)

3.
$$\frac{1}{P_{eq}} = \frac{1}{P_1} + \frac{1}{P_2} + \dots + \frac{1}{P_n}$$

(اگرزیاده use ایس مولاعیوں تو یہ فار مولا value کریں۔)

4.
$$P_{eq} < P_{min}$$

(device يَى الركولَ الك device مِل عَنْ for وجائ توباقى ب مجى off موجائير ك

5. To decreases the power devices are connected in series-Example: Two filament bulbs having power rating 100 W are connected in series as shown in the figure below. Then equivalent power will be? (a) 70 W (b) 150 W (c) 240W (d) 300W

Solution: $P_{eq} = \frac{P_1 P_2}{P_1 + P_2} = \frac{100 \times 200}{100 + 200}$ $= \frac{100 \times 200}{300} = \frac{200}{3} \sim 66 \text{ W}$

Parallel Combination:

If 'n' number of devices are connected in parallel then

$$P_{eq} = nP$$

سب على ويكسي اگر device كى ولميوز same يى تو Power كوتعدادے

$$P_{eq} = P_1 + P_2 + \cdots P_n$$

اگرد Sum Spower و Swidevices كاروي الكردي Sum Spower وي

$$P_{eq} > P_{max}$$

DCAT PREP BOO

2. To increase the power devices are connected in parallel. Example:

Two filament bulbs having power rating 200 W and 500 W are connected in parallel Then equivalent power will be about?

(a) 140 W

(b) 250 W

(c) 350 W

(d) 700 W

Solution:

$$P_{eq} = P_1 + P_2$$

= 200 + 500 = 700 W

یدر سی اور سی کام devices برابر موتا ہے۔ . . مارے کرون من تمام devices برابر موتا ہے۔

$$P = \frac{V^2}{R} \text{ or } P \propto \frac{1}{R}$$

$$-\frac{V^2}{R} \text{ or } P \propto \frac{1}{R}$$

نال کے طور پرزیادہ withick filament کے لیے انتخاب fresistance & filament کے لیے انتخاب کے انتخاب کی انتخاب کے انتخاب کے انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخاب کے انتخاب کی انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخاب کی انتخاب کی انتخاب کے انتخاب کی انتخا

P ∝ thickness of filament

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 $P = VI \text{ or } P \propto I$

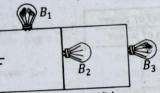
- S _ Jdraw Dienet os Current Down Jdevice .4

PERSONAL ST

bum Lei Son / off ei Fremove Lei Sadd device of CParallel (open circuit) مو جانے _parallel من ملک باقی devices کی فرق نیس پرتا۔

Example:

If three bulb B_1 , B_2 and B_3 are connected with a battery as shown in the figure. If B_1 is burnt then what is effect on brightness of B_2 and B_3 .



(a) increases

(b) decreases (c) remain

(d) become

Solution:

If B₁ is burnt then it

will break the circuit

current thus brightness

of B2 and B3 becomes

and stop the flow of

- Lofter المحاية Bor Bor Bor المدين المالية المحالية الم

- Selen & brightness & B11918 2 19 97 & current

> المريد فرق عدي series حدث remove add device والمريد فرق الم ا كروم الله brightness بوجائ كاور brightness بوجائ كارو - المناف المناف

ELECTROMOTIVE FORCE

Energy supplied by battery per unit charge is called electromotive force or EMF of battery.

$$EMF = \frac{Energy \ supplied}{Charge}$$

- > It is a scalar quantity.
- $Its SI unit is volt(<math>\int c^{-1} = kgm^2s^{-3}A^{-1}$)
- ightharpoonup Its dimensions are $[ML^2T^{-3}A^{-1}]$

Internal Resistance:

Resistance due to presence of electrolyte between the electrodes is called internal resistance. It is denoted by 'r'.

- > EMF and internal resistance act in series.
- > Internal resistance of an ideal voltage source is zero.

Dependence:

Distance between electrodes $(r \propto d)$.

Area between electrodes $\left(r \propto \frac{1}{4}\right)$.

Nature or concentration of electrolyte.

بادر محين Battery بر Coulomb چارج كو جنتني

Energy مياكك كادو EMF

کے طور پر Coulomb م Battery کے اور پر 12V کی

كولاا ازى مياكر ع

Temperature

By AZHAR IQBAL 0336-7098894

UNIT 07

Three Important Cases:

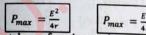
1. Closed Circuit:

Consider an external resistance R is connected across a battery of EMF 'E' and internal resistance 'r'

- > Current drawn from the battery is
- > Potential drop across external resistance or terminal Potential $V_t = IR$ difference is
- Potential drop across internal resistance is 'I r'.
- ▶ Equation of cell/battery when it is discharging is $E = V_t + Ir$ and $(V_t < E)$

CURRENT ELECTRICITY

- > Power dissipated in external resistance is $P = V_t I = I^2 R = \frac{V_t^2}{R} = \frac{E^2 R}{(r+R)^2}$
- > Output power drawn from battery is maximum when R=r (internal resistance = external resistance)



> Current drawn from battery is maximum when R= r

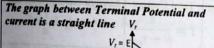


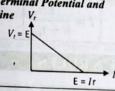


r=R

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NOTE: when battery is being charged i.e current is given to battery then $V_* = E + Ir$ and $V_* > E$





For x-intercept V= 0 So E = Ir or $r = \frac{E}{r}$ For y-intercept I= 0

مراف سے EMF اور Internal resistance دونوں معلوم کے جاسکتے ہیں۔

2. Open Circuit:

When no current is being drawn from battery or cell it is said to be open circuit.

- > Current through circuit= 0
- \triangleright Terminal potential difference is equal to $(V_t = E)$.
- > Potential drop across internal resistance and external resistance is zero. R

3. Closed Circuit:

When two terminals of cell or battery are joined together by thick wire.

Maximum current is drawn from battery



Terminal potential difference is zero (V = 0).



GROUPING OF CELLS

1. Series Grouping:

1. Series Grouping: If opposite terminals are connected with each other.	Equivalent EMF is given as $E_{eq} = E_1 + E_2 + E_3$ Equivalent internal resistance is given as $r_{eq} = r_1 + r_2 + r_3$
E_1 E_2 E_3	

			1 11
If similar termina	Is are conf	nected with ear	ch other.
Il Sillillai terillilla	as the com	To .	
	. 11	ALLA	
	m-1-	MM-	
E.	E ₂	Mark Street	
-1	William I		

Equivalent EMF is given as $E_{ea}=E_1-E_2$

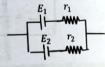
Equivalent internal resistance is given as $r_{eq} = r_1 + r_2$

> If cells are identical

Fauivalent EMF is	Equivalent internal resistance	Current	Power
$E_{eq} = nE$	$r_{eq} = nr$	$I = \frac{E_{eq}}{R + r_{eq}}$	$P_{max} = n(\frac{E^2}{4r})$

2. Parallel Grouping:

If similar cathodes terminals are connected together at one point and anodes are connected together at other point.



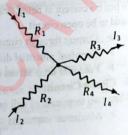
Equivalent EN	IF Equivalent internal resistance	Total Current	Current through each cell
is $E_{eq} = E$	$r_{eq} = \frac{r}{n}$	$I = \frac{E}{R + r_{eq}}$	$I_n = \frac{1}{n}$

KIRCHOFF'S RULES

1. Kirchoff's First Rule:

- > Kirchoff's first rule is also known as Kirchoff's current rule, point rate or junction rule.
- > Kirchoff's 1st rule is manifestation of law of conservation of charge.

"Sum of all the currents flowing towards a point is equal to sum of all the currents flowing away from point." "sum of all the currents meeting at a point is equal to zero"



 $\Sigma I = 0$

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Then the current I will be

(b) 3A (c) 5A (d) 7A (a) 1A

Solution:

CURRENT ELECTRICITY

Example: Figure shows a network of current. Total incoming current = 2 + 4 + 1 = 7A

Total out going current = 7A OR

"Sum of all the currents meeting at point is equal to zero" $\Sigma I = 0$

 $2A + 4A + 1A - I = 0 \Rightarrow I = 7A$

3A

sign	Incoming current	Outing
convention .	+ve	-ve

Example:

UNIT 07

Figure shows a network of currents then current I will be

(A) 1A (C) 5A

Trave

- (B) 4A
- (D) 7A

Solution: 4 - 3 - 1 = 0 $\Rightarrow I = 1A$

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2. 2nd Rule:

"Algebraic sum of all potential changes in closed circu is equal to zero"



- ➤ Kirchoff's 2nd Rule is also known as Kirchoff's Volage Rule (KVL) and Kirchoff's Loop Rule.
- ➤ Kirchoff's 2nd Rule is manifestation of law of conservation of energy.

~~~	w	10/10/11	1 —	
			1.	$\neg$
	1 .			
	1			
	'			
		-		
	~	~~	_	
		Ra		
	Age of the	( ! ————————————————————————————————————	$R_2$	- (1 

 $+E_1 - IR_1 - E_2 - IR_2 = 0$ 

FOR BATTERY ersing from Traversing from		FOR R	ESISTORS
to +ve	Traversing from +ve to -ve	Traversing in direction of current	Traversing in opposite direction of current
	E ————————————————————————————————————	-IR	1 R · +/R

### Wheatstone:

Wheatstone bridge is a circuit which is used to determine unknown resistance of a wire.

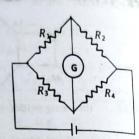
It's circuit diagram is shown in the figure:

**Balancing Condition** 1.  $\frac{R_1}{R_2} = \frac{R_3}{R_1}$  or  $\frac{R_1}{R_2} = \frac{R_2}{R_2}$ 

جرار المرافع ratio لا Adjacent resistances

2.  $R_1R_4 = R_2R_3$ 

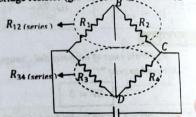
Product Copposite resistances



**Under Balancing Condition** 

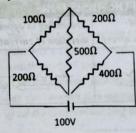
- > No current passes through the galvanometer and shows zero deflection.
- > Point B and D are at same potential.  $V_B = V_D$  and  $V_B - V_D = 0$
- $> R_1 R_4 = R_2 R_3$ اگر کوئی تین resistances معلوم ہوں تواس ے چو تھی کو معلوم کر یکے ہیں۔ چاہیے۔

To find equivalent resistance of the circuit bridge resistor (galvanometer) is removed



R₁₂ and R₃₄ are in parallel

Five resistors are connected with a 100V battery as shown in the figure below:



 $R_1R_4 = R_2R_3$ Solution:  $\Rightarrow 100 \times 400 = 200 \times 200$ 400 = 400

Balancing condition is satisfied

> No current passes through 500Ω

 $V_B = V_D$  or  $V_B - V_D = 0$ 

### Equivalent resistance:

 $R_{12}=100+200=300$  and  $R_{34}=200+400=600$  $Req = \frac{300 \times 600}{300 + 600} = 200\Omega$ 

# IINIT 08 >> ELECTROMAGNETISM

### Electromagnetism:

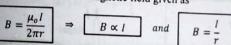
UNIT 08

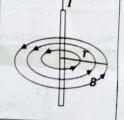
- > Branch of physics which deals with study of magnetic effects produced by motion of charges is called electromagnetism.
- If a magnetic compass is placed near current Note: When a steady current is carrying conductor, the magnetic field will passing through a conductor then deflect its direction.
- > In 1820 Orested discovered that current passing through a conductor produces magnetic field around the conductor

Inside the	Outside the
conductor	conductor
$E \neq 0$ but B	$B \neq 0$ but E
= 0	= 0

### Magnetic Field Due To Current Carrying Straight Conductor

- Magnetic field produced by current carrying straight conductor is circular (concentric circles)
- > Magnetic field lasts only as long as current is passing through conductor.
- > If 'I' is current passing through conductor then at any distance 'r' from the conductor magnetic field given as











Where  $\mu_o = 4\pi \times 10^{-7} Wbm^{-1}A^{-1}$  and known as permeability of free space.

Note r is distance from the conductor and it is not radius of wire of conductor.

- Direction of magnetic field depends upon direction of current and it is determined by right
- "Grasp the conductor in your right hand with thumb pointing in the direction of current then curling fingers represents the direction of magnetic field".





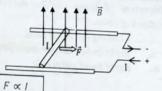
### FORCE ON CURRENT CARRYING CONDUCTOR IN A UNIFORM MAGNETIC FIELD

When a current carrying conductor is placed in magnetic field it will experience force given as



- Force on the conductor is directly proportional to current passing through conductor.
- > Force on the conductor is directly proportional to length of conductor inside the magnetic field
- Force on the conductor is directly proportional to external magnetic field.

> Force on the conductor is directly proportional to  $sin\theta$  where ' $\theta$ ' is angle between magnetic field and direction of current through conductor.  $F \propto sin\theta$ 



 $F \propto L$  $F \propto B$ 

### Magnetic Induction:

Magnetic induction is defined as magnetic force acting on one meter length of conductor, placed perpendicular to the magnetic field lines when one ampere current is passing through the conductor.

IL sino

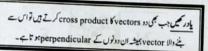
- ➤ Its SI unit is Tesla  $(T = Nm^{-1}A^{-1} = kgm^{o}s^{-2}A^{-1})$
- > Its dimensions are  $[ML^{o}T^{-2}A^{-1}]$

### Tesla:

Magnetic induction is one tesla if one newton force is acting on one meter length of conductor placed perpendicular to magnetic field lines when one ampere current is passing

### Vector form:

Magnetic force on current carrying conductor in vector form is given as



- $\vec{F} = I(\vec{L} \times \vec{B})$ Magnetic force is always perpendicular to length of conductor and magnetic field lines
- Magnetic force is maximum when conductor is placed perpendicular to magnetic field  $F_{max} = ILB$
- Magnetic force is zero or minimum when conductor is placed parallel or anti-parallel to magnetic field lines.  $F_{min} = ILBsin0^{\circ} = 0$

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### **Short Cut Method**

1. کزندی طرف اینا Thumb کریں۔

2. Thumb على مو كا- anti-clockwise direction

- Brelockwise = side & room .3

### Current I is out of the plane of paper

From above:

Field is anti-clockwise

From below: Field is clockwise



Current I is out of the plane of paper

From above:

Field is Clockwise

From below:

Field is Anti- clockwise



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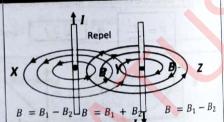
When two current carrying wires are placed near each other. When current is in opposite direction

- Wires attract each other.
- > Since direction of force is always from strong field to weak. Hence
- > Field is strong at X and Z

$$(B_{net} = B_1 + B_2)$$

Field is weak at Y

$$(B_{net}=B_1-B_2)$$



- > Wires repel each other.
- > Since direction of force is always from strong field to weak. Hence
- > Field is strong at Y

$$(B_{net}=B_1+B_2)$$

Field is weak at X and Z

$$(B_{net} = B_1 - B_2)$$

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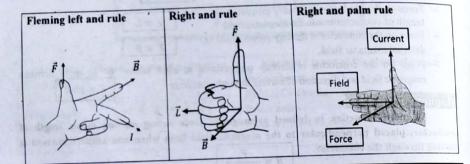


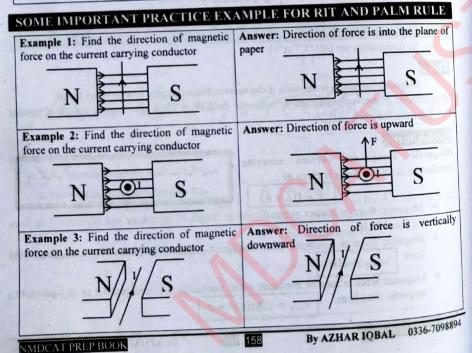
### Direction of Force:

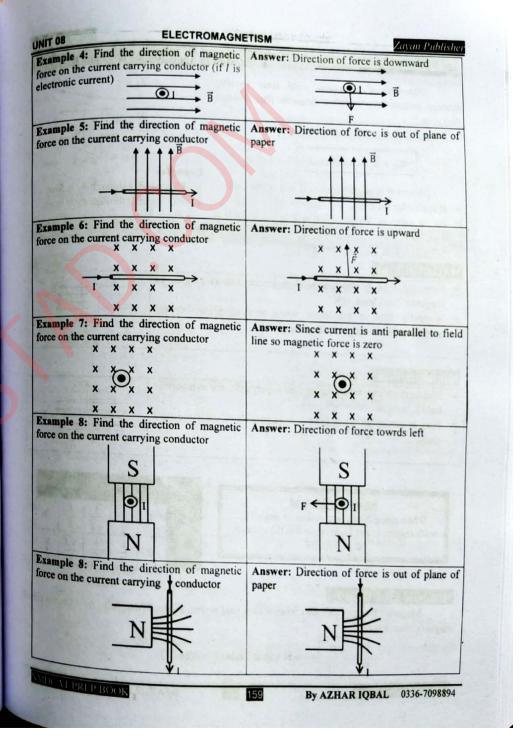
Direction of force can be determined following rules.

- i. Fleming left hand rule.
- ii. Right hand rule for cross product.
- iii. Right hand palm rule









### MAGNETIC FLUX

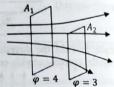
"Number of magnetic field lines passing through certain area is called magnetic flux through that area."

> Magnetic flux is denoted by ØB and

$$\phi_B = \vec{B} \cdot \vec{A} = BA \cos\theta$$

(Where  $\theta$  is angle between  $\vec{B}$  and vector area)

- > It is a scalar quantity.
- > Its SI unit is Weber  $(Wb = T: m^2 = NmA^{-1} =$  $kam^2s^{-2}A^{-1}$ ).
- ightharpoonup Its dimensions are  $[ML^2T^{-2}A^{-1}]$ .

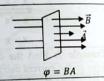


#### Example:

- > Flux passing through A₁ is four.
- > Flux passing through A2 is three.

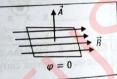
### **Maximum Flux:**

- > Magnetic flux is maximum when vector area is parallel to magnetic field lines. OR
- > Magnetic flux is maximum when area or plane is held perpendicular to magnetic field lines.



### Minimum Flux:

- > Flux is minimum when vector area is perpendicular to magnetic field lines. OR
- > Flux is minimum when area is held parallel to magnetic field lines.



### Short Cut Method

When plane or surface makes an angle ' $\theta$ ' with magnetic field lines then use the relation.  $\emptyset = BAsin\theta$ 

θ	00	$30^{o}$	45°	60°	90°
Cosθ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Sinθ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1

### Magnetic Flux Density:

Magnetic flux per unit area when area is held perpendicular to magnetic field lines is called magnetic flux density

$$B = \frac{\emptyset}{A_1}$$
  $\Rightarrow$  SI unit is Tesla  $(T = Wbm^{-2})$ 

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### AMPERE'S LAW

**ELECTROMAGNETISM** 

> Ampere's law is stated as

"Sum of all the quantities  $(\vec{B}, \Delta \vec{L})$  for all path elements into which complete loop has been divided is equal to \(\mu_o\) times the total current enclosed by loop"

$$\sum_{i=1}^{n} (\vec{B}.\Delta \vec{L})_{i} = \mu_{o}I$$

Where  $\mu_0$  is permeability of free space and  $\mu_0 = 4\pi \times 10^{-7} Wbm^{-1}A^{-1}$ 

Ampere's law is used to determined magnetic flux density.

### FIELD DUE TO A CURRENT CARRYING SOLENOID

### Solenoid:

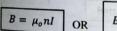
"Solenoid is a long, tightly wound cylindrical coil which behaves like a bar, magnetic when current passes through it."

Magnetic field outside the solenoid is non-uniform and weak (can be neglected).

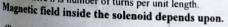
Magnetic field produced at the ends of solenoid is non-uniform and

 $B_{end} = \frac{\mu_o nl}{2} \left( B_{end} = \frac{B_{center}}{2} \right)$ 

> Magnetic field produced inside the solenoid strong and nearly uniform.



Where n is number of turns per unit length



- Number of turns of solenoid  $(B \propto N)$
- Current passing through solenoid  $(B \propto I)$
- Length of solenoid  $\left(B \propto \frac{1}{l}\right)$
- Nature of core material (by increasing iron core inside the solenoid magnetic field

 $\mu_o NI$ 

# Three important cases:

- 1. If solenoid is stretched then its length increases but no. of turns remains same so magnetic
- 2. If solenoid is compressed then its length decreases but no. of turns remains same so its magnetic field increases
- 3. If solenoid is cut into two parts and same current passes through each part then magnetic field with become half field will remain same because both no. of turns and length become half.



# FORCE ON MOVING CHARGE IN A MAGNETIC FIELD

> Force acting on a current carrying conductor in magnetic field is actually force acting on moving charges.

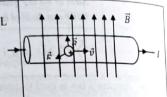
No. of charge carriers per unit volume =n

No. of charge carriers in volume AL of the conductor = n A L

Charge on each particle = q

Total charge in the conductor of volume AL = nqAL Time taken by charges to pass through conductor  $=\frac{L}{L}$ 

Current passing through the conductor =  $\frac{nqAL}{L} = nqAv$ 



When charges are moving in the magnetic field they experiences the magnetic force and the resultant of magnetic forces acting on moving charges is the magnetic force acting on current carrying conductor

▶ If a charge q is moving with velocity v in a magnetic field B is given as

 $F = avBsin\theta$ 

 $\theta$  is angle between  $\vec{v}$  and  $\vec{B}$ 

> Magnetic force depends upon

Charge of the particle

Fxq

NOTE: Magnetic force on moving charges is independent of length area or dimensions of the conductor.

Velocity of the particle  $F \propto v$ 

Magnetic field  $F \propto B$ (iii).

Direction of motion of charged particle. (iv).

 $F \propto \sin\theta$ 

Force acting on a moving charge is maximum when charge is moving perpendicular to magnetic field lines.

 $F_{max} = qvBsin90^o = qvB$ 

### Minimum Force:

Force acting on a particle is zero or minimum when

- Charge is zero (neutral particle)  $\Rightarrow F = (0)vBsin\theta = 0$
- Charged particle is at rest (v = 0),  $\Rightarrow F = q(0)Bsin\theta = 0$
- Magnetic field is zero (B = 0),  $\Rightarrow F = qv(0)\sin\theta = 0$
- Charge is moving either parallel or anti-parallel to magnetic field lines.

 $F = qvBsin\theta^{\circ} = qvBsin180^{\circ} = 0$ 

### Vector Form:

Magnetic force on moving charge in vector form is given as

$$\vec{F} = q(\vec{v} \times \vec{B})$$

Magnetic force is always perpendicular to velocity of charge and magnetic field. By AZHAR IQBAL 0336-7098894

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Work done by magnetic force is always zero

(: Fm is perpendicular to velocity and displacement).

**ELECTROMAGNETISM** 

- Magnetic force is only deflecting force and it cannot accelerate or decelerate the charge.
- When charge in moving in uniform magnetic field its speed, K.E, angular velocity, time period, frequency and angular momentum remain constant.
- Angular acceleration and torque by magnetic force is zero.
- Only direction of velocity, momentum, acceleration and magnetic force are changing.

### Direction of Force:

Direction of force acting on a moving charge

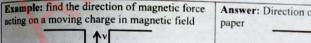
in a magnetic field is determined by

- Right hand palm rule
- Fleming left hand rule

بادر مي اگر جارج + ve كى باك عا-موتو right كى استعال کری

### How to Apply Right Hand Palm Rule

S ب سے پہلے Right hand کھٹر بنائیں۔ 6۔ Fingers کا direction کیلا کی طرف Sel کی ہے۔ 7۔ ہاتھ کا Rotate کر کے Rotate کی طرف Set کے مطرف Force میں معمل کرے گا۔ 8۔ توجی طرف Force میں Sedirection کی اس طرف Force میں کا معمل کرے گا۔





Example: find the direction of magnetic force

acting on a moving charge in magnetic field

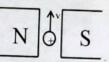
Example: find the direction of magnetic force acting on a moving charge in magnetic field



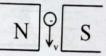
Example: find the direction of magnetic force acting on a moving charge in magnetic field

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Answer: Direction of force is into the plane of



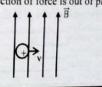
Answer: Direction of force is into the plane of

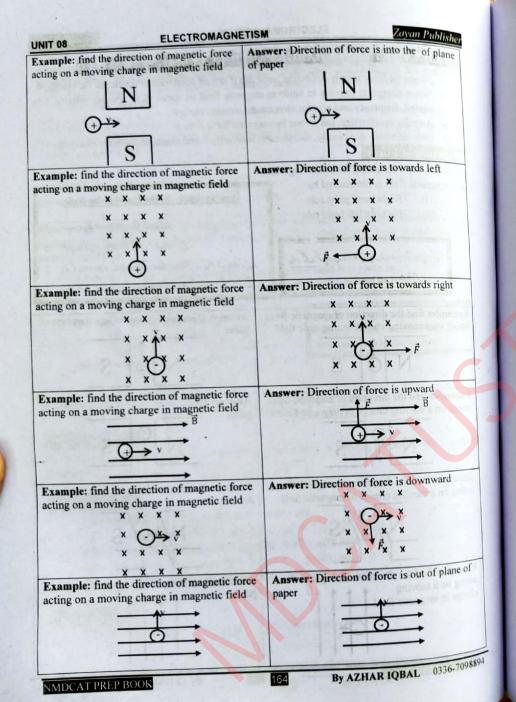


Answer: Direction of force is vertically downward



Answer: Direction of force is out of plane of paper

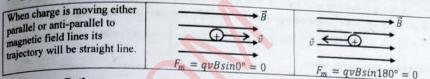




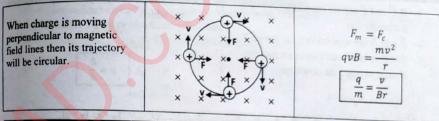
UNIT 08 ELECTROMAGNETISM

# TRAJECTORY OF A CHARGE PARTICLE IN MAGNETIC FIELD

### 1. Straight Path:



### 2. Circular Path:



Radius of circular path	Angular frequency OR Angular Velocity	Time Period	Frequency
$r = \frac{mv}{qB}$	$\omega = \frac{qB}{m}$	$T = \frac{2\pi m}{qB}$	$f = \frac{qB}{2\pi m}$

### 3. Helical path:

When charge is moving neither parallel, antiparallel or perpendicular  $(\theta \text{ is other than } 0^o, 90^o \text{ or } 180^o)$ 

then its trajectory is helical or helix.



# COMPARISON BETWEEN ELECTRIC AND MAGNETIC FORCE

Electric Force	Magnetic Force
1. Electric force is given as $\vec{F}_e = q\vec{E}$ .  2. Electric force only depends upon charge and electric field and independent of velocity and direction of motion.  3. Electric force is given as $\vec{F}_e = q\vec{E}$ .	Velocity mannatin field and direction of
of electric field.	Magnetic force is always perpendicular to direction of magnetic field and velocity.
deflect the charge.	Magnetic force is only deflecting force and cannot accelerate or decelerate the charge.

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### LORENTZ FORCE

"If a charge q is moving with velocity v in a region where electric field is E and magnetic field is  $\vec{B}$  then the net force on the charge is vector sum of electric force  $\vec{qE}$  and magnetic force  $\vec{F} = a\vec{E} + a(\vec{v} \times \vec{B})$  $q(\vec{v} \times \vec{B})$ ."

It is known as Lorentz force.

### Velocity Selector:

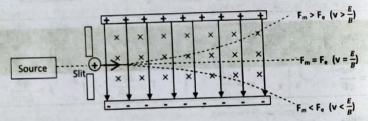
- $\vec{v}$ ,  $\vec{E}$  and  $\vec{B}$  are set mutually perpendicular.
- $ightharpoonup \vec{E}$  and  $\vec{B}$  are applied in a such a way that they may exert force on moving charge in opposite direction.
- > Only these charges passes undeviated for which

$$F_m = F_e$$

$$qvBsin90^o = qE$$

$$v = \frac{E}{B}$$

Solution:



Example: Alpha particles ranging in speed from 1000ms⁻¹2000 ms⁻¹ enter into a velocity selector where electric field intensity is 300 Vm⁻¹ and magnetic induction is 0.20T. The particles which move undeviated will have speed

(a)1000 ms⁻¹ (b) 1250 ms⁻¹ (c) 1500 ms⁻¹ (d) 2000 ms⁻¹

Example: A velocity selector has magnetic field of 0.30Tand a perpendicular electric field of 10000Vm⁻¹ is applied .Then the particles which move undeviated will have speed

(a)330 ms⁻¹

(b) 3300 ms⁻¹ (c)33000 ms⁻¹ (d) 3000 ms⁻¹

 $v = \frac{300}{0.2} = 1500 \text{ ms}^{-1}$ 

**Example:** If a charge q is moving in a velocity selector. The charge will move in a straight path if:

- $(a)v = \frac{E}{R}$
- (b) E is perpendicular to B.
- (c)  $F_m = F_e$
- (d) All of these

### CHARGE TO MASS RATIO OF AN ELECTRON

- Charge to mass ratio  $\left(\frac{q}{m}\right)$  of a particle only depends upon nature of particle.
- In case of neutron or any other neutral particle  $\frac{q}{r} = 0$  and  $\frac{m}{r} = \infty$
- $\Rightarrow \left(\frac{q}{m}\right)_{electron} > \left(\frac{q}{m}\right)_{proton} > \left(\frac{q}{m}\right)_{q=particle}$

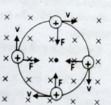
### Determination of Charge to Mass Ratio of an Electron

- > To determined charge to mass ratio of electron beam of electrons is projected in uniform magnetic field in perpendicular direction.
- Magnetic field exerts the force on electrons and bends the beam in a circular path.

$$F_m = F_c$$

$$qvB = \frac{mv^2}{r}$$

$$\frac{q}{m} = \frac{v}{Br}$$



- > To determine the radius of circular path beam of electrons is projected in a glass bulb filled with H₂ gas at low pressure due to ionization and de-excitation path of electrons becomes

> If beam of electrons is accelerated through potential difference V then Gain in Momentum: Gain in Velocity: K.E = aV $P = \sqrt{2maV}$ 2qV

- > Putting value of V in eq(i)
- Accurately Known value of e/m for electron is  $1.7588 \times 10^{11} Ckg^{-1}$ .

Example: A charge particle is moving in a circular path in a perpendicular magnetic field. By increasing the magnetic field charge to mass ratio of the particle will: (a)Increase

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(b) decrease

(c)Remain same√ (d) None

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Solution:

Charge to mass ratio only depends upon nature of particles.

UNIT  $09 \rangle\rangle$ 

## **ELECTROMAGNETIC** INDUCTION

### Electromagnetic Induction:

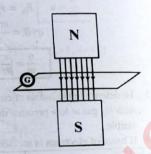
"Changing magnetic flux through a coil induces emf this phenomenon is known as electromagnetic induction."

### Induced emf:

Michael Faraday discovered that when magnetic flux linking with conductor changes an emf is produced in the conductor this emf is known as induced emf.

### **Examples:**

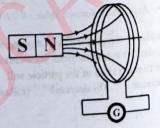
- 1. Consider a coil placed between the two poles of a magnet.
  - When coil is stationary no current or emf is induced because magnetic flux is not changing.
  - When coil is moved along the field lines again no emf is induced because magnetic flux is not changing.
  - When coil is moved across (perpendicular) to field lines, magnetic flux changes and emf is induced.



10000	Induced emf :	and in	duced current depends upon
i	Speed of the coil $(\varepsilon \propto v)$ .	ii.	Applied magnetic field intensity $(\varepsilon \propto B)$ .
iii.	Number of turns of the coil	iv.	Induced emf is independent of resistance of
111.	$(\varepsilon \propto N).$		the coil. But induced current depend
	(2 % 11).		resistance $(1 \propto \frac{1}{R})$ .

### 2. Consider a stationary coil and a bar magnetic is moved near the coil.

- > When magnet is at rest no emf is induced because magnetic flux is not changing.
- When magnet is moved towards the coil magnetic flux increases and an emf is induced.
- > When magnet is moved away magnetic flux decreases and an emf is induced.



**ELECTROMAGNETIC INDUCTION** 

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### 3. Consider a circular coil placed in a magnetic field directed into the plane of paper.

- > Since area of the loop is constant hence magnetic flux is constant and no emf is induced in the coil.
- When coil is distorted its area decreases thus magnetic flux through the coil decrease and an emf is induced.

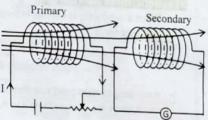


- Consider a rotating coil placed in uniform magnetic field directed into plane of paper.
  - When coil is rotated in magnetic field angle between field lines and vector area changes thus magnetic flux changes and an emf is induced.



### 5. Consider a primary coil connected with battery and rheostat and coil connected with a galvanometer is placed near it as secondary.

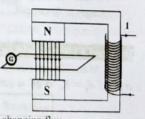
- > When current through primary coil is constant magnetic flux through secondary coil is also constant thus no emf is induced in secondary.
- > When current through primary coil increases, magnetic flux through secondary coil increases and emf is induced in secondary coil.



> When current through primary coil decreases, flux through secondary coil also decreases thus an emf is induced in secondary coil.

### 6. Consider coil is placed in the magnetic field of electromagnet

- ▶ When current through electro-magnet is constant no emf is induced because magnetic flux is not changing.
- When current through electromagnet increases, magnetic flux increases thus an emf induced due to changing flux.
- When current through electromagnet decreases. magnetic flux decreases thus an emf is induced due to changing flux.



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### MOTIONAL EMF

"Emf induced by motion of the conductor across the magnetic field is called motional emf."

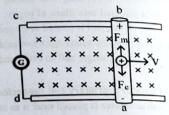
### Dynamic Induced emf:

Emf induced in a conductor when it is moved in stationary magnetic field.

### Statically induced emf:

Emf induced in a conductor when conductor is stationary and magnetic field is moving or charge.

Consider a conductor of length L placed on two rails connected with a galvanometer, a uniform. Magnetic field B is applied into plane of paper and rod is moving with uniform velocity v.



### Magnetic force on charges:

> When a conductor is moving in magnetic field charges inside the conductor experience magnetic force.

$$F_m = qvBsin\theta = qvBsin90^o \quad (:v \perp B)$$

$$F_m = qvB$$

> According to right hand rule direction of magnetic force on +ve charges is directed upward and it move the charges from a to b.

### Electric force on charges:

> +ve charges are concentrated at point 'a' and -ve charges are concentrated at point 'b' these +ve and -ve charges induces an electric field E which exerts an electric force on the +ve charges in downward.  $\vec{F} = a\vec{E}$ 

### Induced Electric field in Conductor:

At equilibrium electric force will be come equal to magnetic force and net force on charge

is zero. 
$$F_e = F_m \Rightarrow qE = qvB$$

$$E = vB$$

- > Induced electric field depends upon:
  - Speed of conductor  $(E \propto v)$
  - External magnetic field  $(E \propto B)$



### Induced Potential Difference:

$$\Delta V = -E\Delta r = -vBL$$

$$\Delta V = -vBL$$

- Induced electric field depends upon:
- Speed of conductor  $(\Delta V \propto v)$
- Length of conductor inside the magnetic field (ΔV α L).
- External magnetic field.  $(\Delta V \propto R)$

### Induced emf in the conductor:

$$induced\ emf = induced\ p.d$$

$$\varepsilon = -vBL$$

### Induced Current:

ELECTROMAGNETIC INDUCTION

If R is resistance of the current loop abcd then induced current is given as

$$I = \frac{vBL}{R}$$

### Induced Charge:

Amount of induced charge in the conductor in a time interval  $\Delta t$  is given as

$$\Delta Q = I\Delta t = \frac{vBL\Delta t}{R}$$

If the angle between velocity of conductor and magnetic field lines is  $\theta$  instead of 90° then Induced electric field:

$$E = -vBsin\theta$$

Induced potential difference:

$$\Delta V = -vBLsin\theta$$

Induced emf:

$$\varepsilon = -vBLsin\theta$$

### Induced emf depends upon

(i). Speed of the conductor

$$(\varepsilon \propto v)$$

Length of conductor inside the field  $(\varepsilon \propto L)$ 

(iii). External magnetic field

$$(\varepsilon \propto B)$$

(iv). Angle between velocity of conductor and magnetic field lines.

$$(\varepsilon \propto Sin\theta)$$

### Maximum emf:

Induced emf is maximum when conductor is moving perpendicular to field lines.

$$\varepsilon = vBLsin90^{\circ}$$

$$\varepsilon_{max} = vBL$$

### Minimum emf:

Induced emf is minimum when conductor is moving along (parallel or anti-parallel) to field lines.

$$\varepsilon = vBLsin0^{\circ} = 0$$

Solution:

### Example:

An emf of 0.5 V is induced between the ends of a metal bar moving through a magnetic field of 0.20 T. What field strength would be needed to produced an emf of 1.5 V between the ends of the bar. If all other factors remain same. (a) 0.3 T (b) 0.6 T (c) 0.9 T (d) 1.2 T

 $(\varepsilon \propto B)$  $B_2 = \frac{1.5 \times 0.2}{0.5} = 0.6 T$ 





### FARADAY LAW

"Average induced emf in a coil of 'N' turns is equal to - ve of rate of change of magnetic flux through the coil."

#### Explanation:

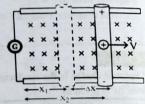
Consider a rod is moving on two rails connected with a galvanometer in presence of magnetic field. As area of loop increases magnetic flux changing through the flux and emf is induced.

$$\varepsilon = -vBL$$

$$\varepsilon = -\frac{\Delta x}{\Delta t}BL$$

$$\varepsilon = -\frac{\Delta A}{\Delta t}B$$

$$\varepsilon = -\frac{\Delta \phi}{\Delta t}$$



یادر محیل Magnetic flux کو تین طرحے change کیاجا سکا ہے۔

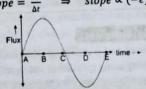
Magnetic فيلذ اور Area ك ور ميان Angle كو

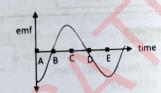
change فیلڈ Magnetic

=2/ change Area

### > Induced emf depends upon

- Number of turns of the coil  $(\varepsilon \propto N)$ .
- Rate of change of flux through the coil  $\left(\varepsilon \propto \frac{\Delta \emptyset}{\Delta t}\right)$
- > Faraday law is used to determine amount of induced emf or induced current.
- ➤ Slope of Ø t graph is directly proportional to induced emf.
- As slope =  $\frac{\Delta \emptyset}{\Delta \theta}$  $\Rightarrow$  slope  $\propto (-\varepsilon)$





- At instants A and E slope of  $\emptyset t$  graph is +ve maximum. So emf is -ve maximum.
- At instants B and D slope of  $\emptyset t$  graph is zero emf also zero.
- At instant C slope of Ø − t graph is -ve maximum. So emf is +ve maximum.

### Information

Faraday's designed a Homopolar generator with which he was able to produce continuous induced current.

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(ii).

- i Schange

### **ELECTROMAGNETIC INDUCTION**

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### DIFFERENT FORMS OF FARADAY LAW

1. If a plane is perpendicular to field lines  $\emptyset = BA \cos 0^\circ = BA$ 

- (i) When B = constant and area is changing then
- $\Delta \emptyset = B\Delta A$  and

- (ii) When A = constant and B
- is changing then  $\Delta \emptyset = (\Delta B)A$  and

# $(\Delta B)A$

- 2. If a plane is not perpendicular to field lines  $\emptyset = BA \cos 0^o = BA$ 
  - (i) When B = constant and area is changing then

$$\Delta \emptyset = B \Delta A \cos \theta$$

and 
$$\varepsilon = N \frac{B\Delta A Cos\theta}{\Delta t}$$

(ii) When A = constant and Bis changing then

and 
$$\varepsilon = N \frac{(\Delta B)ACos\theta}{\Delta t}$$

### Induced Current:

If R is resistance of the coil then induced current is given as  $I = \frac{\varepsilon}{2}$ 

or 
$$I = N$$

### Induced current depends upon

- (i). No. of turns of coil (1 & N)
- Rate of change of flux  $\left(I \propto \frac{\Delta \emptyset}{\Delta t}\right)$ .
- (iii). Resistance of coil  $\left(I \propto \frac{1}{p}\right)$

### Induced Charge:

Induced charge in a time interval  $\Delta t$  is given as

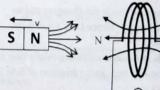
$$\Delta Q = I\Delta t = \frac{N\Delta \phi}{R\Delta t} \times \Delta t \qquad OR \qquad \Delta Q = \frac{N\Delta \phi}{\Delta R}$$

### LENZ'S LAW

Lenz pointed out that –ve sign in faraday law  $\left(\varepsilon = -N\frac{\Delta\theta}{\Delta t}\right)$  indicates that

"The direction of induced current is always so as the oppose that change which causes the current".

- Whenever magnetic flux changes a current is induced which produces a magnetic field that opposes the change in flux.
  - When flux increases it tends to decreases flux.
  - When flux decreases it tends to increase the flux





NOTE:

Lenz's law is in according to law of conservation of energy.

NOTE: Lenz's law is used to determine the polarity of induced emf or direction of induced current.

### HOW TO DETERMINE DIRECTION OF INDUCED CURRENT

Case-I When distance between coil and magnetic is increasing or decreasing.

# Example 1: Magnet is moving away from coil

Steps Steps Steps اگر دور جارے ہول توان میں attraction پیداہو گی۔

Magnet والى Magnet والى اوردوس كى Nell - Same side

Netholockwise و يكسيل توكرنث anticlockwise اور 'S' والى current = side كاك وائز نظر آئے گا_

مندرجه زل steps کورتیب ے follow کری:

اگر قریب آرہے ہول توان میں repulsion بداہو گی۔

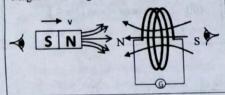
Magnet وال same ميكنيك يول ي كااور

دوسري Nell side ي opposite ي side ول يعد ايو كا_

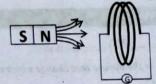
Nelbost = و يكويس كو current, anticlockwise

Example 2:

Magnet is moving towards the coil



Example 3: Magnet and coil are stationary



Since magnetic flux is not changing and no current is induced. Hence Lenz's law is not applicable

Example 4:

they are moving in same direction with same velocity



Since magnetic flux is not changing and no current is induced. Hence Lenz's law is not applicable

Example 3: A magnet is falling over a loop as shown in the figure

- below viewing from above direction of field is
- (a) clockwise (b) anti-clockwise
- (c) either clockwise or anti clockwise
- (d) no current is induced

Answer clockwisw



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مندرجہ ذیل steps کو تیب سے follow کریں:

- 82%flux = Of Using Senter Joseph (i)

ii) کے کے کے Jinduced کے کے Jinduced کو کا ایک کا استعمار کے کا استعمار کی کا استعمار کی کا کا استعمار کا کا ا

into the paper يو نيافيلة out of paper عنونيافيلة out of paper يوابو كا-

(iv). الكوف direction في ما يحد كي الكيال محما يك كرنت كا منا ما على الكيال على كرنت كا منا على عالى عالى عالى

**ELECTROMAGNETIC INDUCTION** 

When magnetic flux is decreasing:



Stens / stens / stens -8 flux = ct Uli Grexit ff - (i)

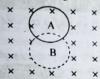
(ii) Induced کزیادہ کرنے کے لیے same direction میں میانیک فیلڈ پیداکرے گا۔

(iv). الكو خان يد ابون والے فيلذ كي direction من كرك وائي ہاتھ كي الكياں محمائي كرن كي - 526 direction

When coil moves from A to B magnetic flux is constant:

ase-II When magnetic flux is increasing or decreasing:

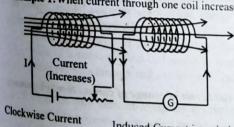
Example 1: When magnetic flux is increasing:



Since magnetic flux is not changing hence no current is induced in the coil.

axe-[1] When current through one coil is increasing or decreasing.

Example 1: When current through one coil increases



مندرجة الsteps كرتب ع follow كرى: (i) بب ملى الدور عالم الدور كالادور كالادور كالكوك كالم الكوك كالم المركة

کا کوشش کرے گا۔ (ii) اگر کا کا کو کل میں کرنے clockwise ہے آودد سری کو کل میں کرنے - 8 rd wanti-clockwise

(iii). کی کوئل می کرنٹ کی direction کھیں اور دوسری کو کل میں کرنٹ

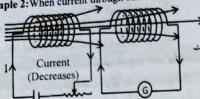
Induced Current is anti-clockwise

- Gropposite & Oldirection &

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Example 2: When current through one coil decreases.



نارد زل steps کرتب ع follow کری: ن ب بهال الاحتاك كرنك كم جو كاتوروسرى الاحتاك كرنداس كوزياده

(زز) اگر پہلی کو کل میں کرنٹ clockwise ہے تو دوسری کو کل میں مجی کرنٹ

clockwise پیدا ہو گا۔ نززن) کہلی کو کل میں کر نٹ کی direction کی کھیں اور دو سری کو کل میں بھی

Clockwise Current

Induced Current is clockwise

### LEN'Z LAW AND CONSERVATION OF ENERGY

Lenz's law is consistent with law of conservation of energy, whenever current is induced by motion of coil or magnet they experience a magnetic force which opposes the motion of coil or magnet. Thus mechanical energy spent to overcome opposition is converted into electrical energy.

#### NOTE

When current is induced in a conductor due to its motion it experiences magnetic force opposite to velocity.

#### NOTE

- Whenever magnetic flux increases. magnetic force is repulsive.
- Whenever magnetic flux decreases, magnetic force is attractive.

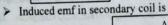
### MUTUAL INDUCTION

"When current passing through primary coil changes an emf is induced in secondary coil this phenomenon is known as mutual induction".

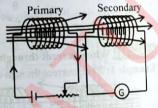
> Flux Ø passing through each turn of secondary coil is directly proportional to current through the primary  $N_s \emptyset_s \propto I_p$ coil.



 $N_s \Delta \emptyset = M \Delta I_n$ 







### Mutual inductance:

"Ratio of average induced emf in secondary coil to rate of change of current through primary coil is called mutual inductance."

Its SI unit is Henry  $(H = VsA^{-1})$ 

- Mutual inductance depends upon:
  - Number of turns of coils. (i).
  - (ii). Area of the coils.
  - (iii). Closeness and orientation of coils.
  - (iv). Nature of core material.

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### SELF INDUCTION

"When current passing through the coil changes an 'emf is induced in the coil itself".

Flux passing through each turn of the coil is directly proportional to current passing through coil.

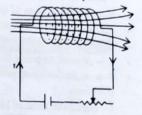
NØXI



NØ = LI

and

 $N\Delta\emptyset = L\Delta I$ 



Lis proportionality constant and it is known as self inductance

#### Self Inductance

Ratio of average induced emf in the coil to rate of change of current through the coil.

> Its SI unit is henry  $(H = V s A^{-1})$ 

Self inductance depends upon

- Shape and number of turns of coil
- Nature of core material (ii).
- Area and length of the coil

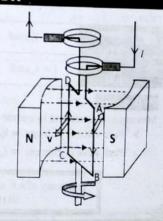
#### Information

Induction heater operates on the principle of electromagnetic induction. The water placed on it in the metal pot is boiling whereas that in the glass pot is not. Even the glass top of the heater remain cool to touch. The coil just beneath the top carries ac that produces changing magnetic flux. Flux linking with pots induce emf in them, Current is generated only in the metal pot that heats up the water.

### A.C GENERATOR

"A device which converts mechanical energy into electrical energy is called generator."

- > Generator works on the principle of Faraday law of induction. When coil rotates in magnetic flux changes through coil and an emf is induced in the coil.
- Emf is only induced along the conductor AB and CD because force acting on the charges is along the wire.
- Emf induced along the conductor BC and DA is zero because force on charges is not along the Wire



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### Induced Emf:

Emf induced in generator is dynamically induced emf and it is given as

$$\varepsilon = N\omega ABsin\theta$$

$$\varepsilon = \varepsilon_0 \sin\theta$$



- · N is number of turns of the coil.
- ω is angular velocity with which coil is rotated.
- · A is area of the coil.
- B is external magnetic field in which coil is rotated.
- $\theta$  is angle between velocity of coil and magnetic field lines.
  - Maximum induced emf is given as

$$\varepsilon = N\omega AB$$

$$\varepsilon_o = N(2\pi f)AB$$

$$\varepsilon_o = N\left(\frac{2\pi}{T}\right)A$$

### Induced Current:

Induced current is given as I =

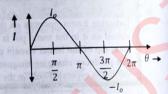
 $I = I_{\alpha} \sin \theta$ 

Current and voltage produced by A.C generator are continuously changing with time.

Where 
$$I_o = \frac{\varepsilon_o}{R} = \frac{N\omega AB}{R}$$

### In one revolution of generator one cycle of A.C

- > Current reverses its direction once.
- Current reaches to maximum value twice.
- Current reaches to zero value twice.
- > Emf or voltage reverses its polarity once.



### Instantaneous value:

Value of alternating current or voltage at any particular instant of time is called instantaneous

value.		AND RESIDENCE STREET		Ζπ
Instantaneous voltage	$V = V_o sin\theta$	$V = V_o sin\omega t$	$V = V_o \sin 2\pi f t$	$V = V_0 \sin \frac{\pi}{T} t$
Instantaneous	$I = I_o sin\theta$	$I = I_o sin\omega t$	$I = I_o \sin 2\pi f t$	$I = I_o \sin \frac{2\pi}{T} t$

### Peak value:

Maximum value reached by current or voltage in a cycle is called peak value.

- $\triangleright$  Peak value of voltage =  $V_o = N\omega AB$
- Peak value of current =  $I_o = \frac{V_o}{R} = \frac{N \omega AB}{R}$

Frequency of A.C used in Pakistan is 50 Hz.

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### UNIT 09 Peak to peak value:

Sum of +ve peak value and -ve peak value is called peak to peak value.

- $V_{p-p} = V_o + V_o = 2V_o$
- $> l_{p-p} = l_o + l_o = 2l_o$

### Root mean square value:

Effective value of alternating current or voltage obtained by taking square root of mean square value is called root mean square value.

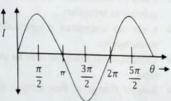
For voltage	For current
$V_{rms} = \frac{V_o}{\sqrt{2}} = 0.7V_o$	$I_{rms} = \frac{I_o}{\sqrt{2}} = 0.7I_o$
$OR V_o = \sqrt{2} V_{rms} = 1.4 V_{rms}$	OR $I_o = \sqrt{2} I_{rms} = 1.4 I_{rms}$

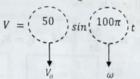
### Phase:

Angle  $\theta$  which specifies the instantaneous value of alternating current or voltage is called phase.

- When  $\theta = i\pi$  current is zero
- When  $\theta = \frac{odd\pi}{2}$  current is maximum.

Example: If the expression for alternating voltage is  $V = 50 \sin 100\pi t$ . Then by comparing with the standard equation  $V = V_0 \sin \omega t$  we can find the following as





	D			-0	w
Peak value	Peak to peak value	rms value	Angular frequency	Frequency	Time period
V _o = 50V	$V_{p-p} = 2V_o$ $= 100V$	$V_{rms} = \frac{V_o}{\sqrt{2}}$ $= 0.7 \times 50$ $= 35V$	$\omega = 100\pi$	$f = \frac{\omega}{2\pi}$ $= 50Hz$	$T = \frac{1}{50}$

If alternating voltage is given as  $V = 350 \sin 100\pi t$  then rms value of voltage will be

- (a) 175V
- (c) 350V

- (b) 700V
- (d) 240V

### Solution:

 $V = 350 \sin 100 \pi t$ 

 $V_0 = 350V$ 

 $V_{rms} = \frac{V_o}{\sqrt{2}} = 0.7 \times 350$ 

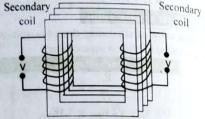
= 240V

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### TRANSFORMER

"Transformer is a device which is used to change a given alternating emf into larger or smaller alternating emf".

> Transformer works on principle of mutual induction. Alternating current passing through primary creates a continuously changing magnetic flux through secondary that induces an emf in secondary.



> Transformer only works on A.C and never on D.C.

- > Coils of transformer are not connected electrically so there is no transfer of charge from primary to secondary.
- > Coils are connected magnetically and power is transferred from primary to secondary magnetically.
- > Coils of transformer are over an soft iron laminated core which concentrates the magnetic field
- Rate of change of flux through each cell must be same

Then

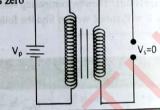
Then
$$V_p = N_p \frac{\Delta \emptyset}{\Delta t} \quad and \quad V_s = N_s \frac{\Delta \emptyset}{\Delta t}$$

$$OR \quad \boxed{\frac{V_s}{V_p} = \frac{N_s}{N_p}}$$

Where  $\frac{N_s}{N}$  is known as transformation ratio.

Note:

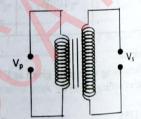
When a D.C source (battery) is connected with primary then output voltage and power are always zero



### Step-up transformer:

A transformer which is used to change a given alternating emf into larger alternating emf.

- $\triangleright$  Increases the voltage level  $(V_s > V_p)$
- $\triangleright$  Decreases the current level  $(I_s > V_p)$
- $\triangleright$  Power level remains same  $(P_{in} = P_{out})$
- > Time period or frequency of A.C remains same.



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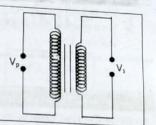
### **ELECTROMAGNETIC INDUCTION**

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### UNIT 09 step-down transformer:

A transformer which is used to change a given alternating emf into smaller alternating emf.

- > Ns < Np
- > Decreases the voltage level  $(V_s < V_s)$
- > Decreases the current level  $(I_s > V_s)$
- Power level remains same  $(P_{in} = P_{out})$
- > Time period or frequency of A.C remains same



### Ideal transformer:

A transformer in which output power is equal to its input power  $(P_{loss} = 0)$  is known as ideal

$$P_{in} = P_{out}$$

$$V_p I_p = V_s I_s$$

$$OR \qquad \frac{V_s}{V_p} = \frac{I_p}{I_s}$$

$$OR \qquad \frac{I_s}{I_p} = \frac{N_p}{N_s}$$

If a primary coil of a transformer is connected to A.C mains then  $V_p = Constant$  $I_p \propto P_{out}$ 

### Use of Transformer in Power Transmission:

- > If R is resistance of transmission line then power loss in transmission line due to heating
- > The power loss can be reduced by decreasing current level.
- > Step-up transformer is used at power generating stations.
- > Power is transmitted at high voltage and at low current and thus power loss in transmission line is considerably reduced.
- At other end a step-down transformer is used to decrease the voltage level and increases

# fficiency of Transformer:

The ratio of output power to input power is known as efficiency of transformer

$$\eta = \frac{P_{out}}{P_{in}} \times 100$$

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For a practical transformer due to power losses in transformer  $P_{out} < P_{in}$  and efficiency is

less than 100%

### Power loss in Transformer:

### 1. Eddy Current Loss:

"When a metal conductor is placed in a changing magnetic field a current is induced in metal conductor this current is known as eddy current".

- > Some power is lost in form of heat due to eddy current produced in the core of transformer.
- > To reduce the eddy current loss core should be assembled with laminated plates of iron.

### 2. Hysteresis loss:

"Energy expended to magnetise and demagnetize the core material in each cycle of A.C is called hysteresis loss".

- > Some power is lost to magnetise and demagnetize the core again and again.
- > To reduce the hysteresis loss soft iron core should be used having narrow hysteresis loop.

#### 3. Cu loss:

- > When current passes through primary and secondary of transformer some power is lost due to the resistance of coils  $(P = I^2 R)$
- > To reduce the Cu loss thick Cu wire is used for winding.

### 4. Magnetic Flux Leakage:

- Flux passing through primary is not completely linked with secondary.
- To reduce this loss secondary coil is kept inside the primary coil by using "E shaped" plates of iron core.

**UNIT 10** >>

UNIT 10

# **ELECTRONICS**

A review of P-type and n-type semiconductors

### P-type semi conductor

- > Trivalent (III-group) impurity atoms are added in pure semi-conductor.
- > Trivalent atoms are known as acceptor atoms e.g. B, Al, Ga, etc.
- > Majority charge carriers are holes.
- Minority charge carriers are electron.
- > Holes move from high potential to low potential.
- Mobility of holes is low

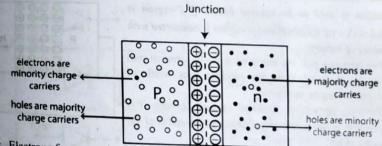
### n-type semiconductor

- > Penta-valent (V-group) impurity atoms are added in pure semi-conductor.
- > Penta-valent atoms are known as donor atoms e.g. P, Bi, Sb, Sn etc.
- > Majority charge carriers are electrons.
- Minority charge carriers are holes.
- > Electrons move from low potential to high potential.
- > Mobility of electrons is high.

### **ELECTRONICS**

**ELECTRONICS** 

"When a crystal of Si or Ge is grown in such a way that one half is doped with trivalent impurity and other half is doped with pentavalent impurity p-n junction is formed."



Electrons from n-region diffuse to p-region thus a layer of +ve immobile ions is formed in p-and n-region and around the junction.

### Depletion Region:

- "Region produced across the junction containing immobile ions and no charge carriers is called depletion region."
  - Depletion region contain immobile (stationary) ions which do not act as charge carriers.

# Potential barriers OR Knee Voltage:

"Potential difference produced across the junction which stops the diffusion of electrons is called potential barrier or knee voltage."

Potential barriers is 0.3V for germanium and 0.7V for silicon.

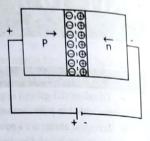
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### Forward biases P-n junction

"p-n junction is said to be forward biased if P-region is connected with +ve and n-region with -ve terminal of battery."

- > +ve terminal repel the holes towards the junction and ve terminal repel the electrons towards the junction thus width of depletion region decreases.
- > When applied voltage is greater than potential barrier electrons and holes crosses the junction and a current starts flowing through P-n junction.



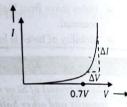
- > Forward current is due to majority charge carriers and is order of mA.
- > Maximum current limit for a junction is decided by power.

### Forward Resistance:

Resistance of P-n junction when it is forward biased is called forward resistance.

$$r_f = \frac{\Delta V}{\Delta I}$$

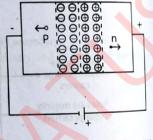
(its value is very small in few ohms)



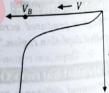
### Reverse biased P-n junction:

P-n junction is said to be reverse biased if P-region is connected with - ve terminal and n-region is connected with +ve terminal of battery.

- > +ve terminal pull the electrons and -ve terminal pull the holes away from the junction thus width of depletion region increases.
- > Reverse current or leakage current through P-n junction is due to minority charge carriers and is of the order of uA.



- > If reverse voltage is increased covalent bonds break and large number of electrons are released. This causes a sudden increase in current. This is called Zener effect.
- If reverse bias voltage is increased further, minority charge carriers attain high velocity and knock down the bound electrons from covalent bonds by collisions and current increases rapidly this is called Avalanche effect or avalanche break down.
- reverse resistance of P-n junction is very large and is of the order of mega-ohms.



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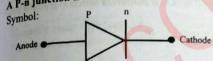
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> Note: Net current through the junction is due to electrons and holes which is given by  $I = I_o + I_h$

### DIODE

A P-n junction is known as semi-conductor diode.



Arrow کرنٹ کی direction کو ظاہر کر رہی ہے مطلب Arrow والی direction کے کرنٹ گزر سکتا ہے اور دوسری direction

	Forward biased diode Examples	کرنے میں گزر سائے۔ Reverse biased diode Examples
Kcathode A	Forward biased ہونے کیلئے anode کا پو فینشل phlghle	Reverse biased ہونے کیلیے anode کا پوٹینٹشل low اور Reverse biased کو ٹینٹشل wilow کو پیششل پوٹینٹشل famile کو پیشنشل پوٹینٹشل wilow کو پیشنشل میں اور کا میں کا میں کا میں کا میں کا میں کا اور کا
1.	-5V	-3V 0V
2.	0V −3V	1V 4V
3.	3V 0V	-5V -2V
4.	-2V -5V	0V 3V

### RECTIFICATION

"Process of conversion of alternating current into direct current is called rectification."

- > Device which is used to convert A.C into D.C is called rectifier.
- Diode can be used as rectifier.
- > There are two types of rectification.
  - i. Half wave rectification

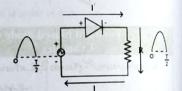
ii. Full wave rectification

### Half wave rectification:

- > "A type of rectification in which only one half of A.C is converted into D.C is called half wave rectification."
- > Minimum one diode is required for half wave rectification.

### During +ve half cycle:

- > Diode is forward biased.
- > Resistance of diode will become very small.
- > Output pulse is +ve.
- Voltage drop across the diode is approximately zero.
- > Voltage drop across the load resistance R is equal to source voltage.





اوروال A.C source اوروال +ves Terminal

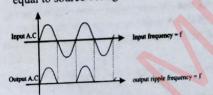
ii. اگر می کون output می او R _ Lost pulse +ve

### Note

Peak Inverse Voltage: (PIV) PIV is maximum reverse voltage that a diode rectifier can block in reverse biased state.

### During -ve half cycle:

- Diode is reverse biased.
- Resistance of diode will become very large.
- Output voltage is zero.
- Voltage drop across load resistance R is zero.
- Voltage drop across the diode is maximum equal to source voltage.

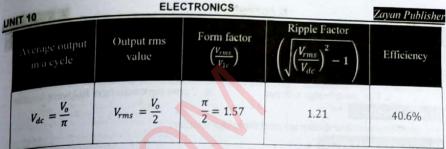


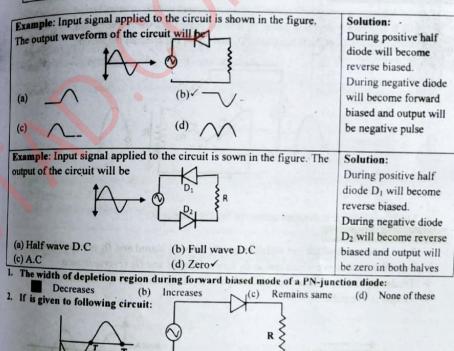


- If 'f' is frequency of input signal then output ripples also have
- If 'T' is time period of input signal then output ripples also have time period 'T'

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The output voltage during  $0 \rightarrow \frac{T}{2}$  will be:

- (a) Positive half Zero
- (b) Negative half
- 3. A full wave rectifier is being used to rectify an A.C voltage of 110 V, 60 Hz. The number of pulses of rectified current obtained in five seconds is:
- (a) 300 (b) 60 600 600 (c) 1 a full-wave center tap transformer rectifier, how many diodes conduct at a time? (d) 120 (c) 3

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### Full Wave Rectification:

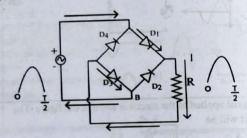
- > A type of rectification in which both halves of A.C are converted into D.C is called full wave rectification.
- > There are two types of full wave rectification. i. Full wave bridge rectifier.
  - ii. Center tap transformer full wave rectifier

### Bridge Rectifier:

> Minimum four diodes are used for bridge rectifier.

### During +ve half cycle:

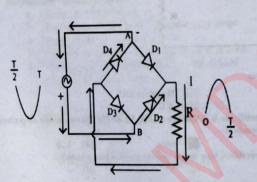
- ➤ Point A becomes +ve which makes D₁ forward biased and D₄ reverse biased.
- ➢ Point B becomes −ve which makes D₃ forward biased and dereverse biased.
- > Diodes D₁ and D₃ conducts but diodes D₂ and D₄ do not conduct the current.



Maximum voltage is dropped across the load resistance R.

### During -ve half cycle:

- ➤ Point A becomes which -ve which makes D₄ forward biased and D₁ reverse biased.
- > Point B becomes +ve which makes D₂ forward biased and D₃ reverse biased.
- Diodes  $D_2$  and  $D_4$  conduct but diodes  $D_1$  and  $D_3$  do not conduct the current.
- > Output is +ve pulse.



- If " is frequency of input signal then output ripples have frequency '2f'
- If T' is time period of input signal then output ripples have time period 'T/2'

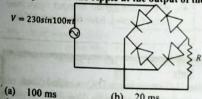
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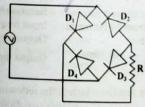
UNIT 10	ELECTRO	NICS		ayan Publisher
Average output in a cycle	Output rms value	Form factor $\left(\frac{V_{rms}}{V_{1c}}\right)$	Ripple Factor $\left(\sqrt{\left(\frac{V_{rms}}{V_{dc}}\right)^2 - 1}\right)$	Efficiency
$V_{dc} = \frac{2V_o}{\pi}$	$V_{rms} = \frac{V_o}{\sqrt{2}}$	1.11	0.48	81.2%

Example: In the following figure wha cycle of the input?	t happens for the positive half	D1 D2
(a) D ₁ and D ₄ conduct (c) D ₃ and D ₂ conduct	(b) D ₁ and D ₂ conduct (d) D ₄ and D ₃ conduct	D3 D4 R
Example: The output of the	e following circuit will be:	Solution: during +ve half  V.  During -ve half
(a) Pulsating full wave D.C (c) Sinusoidal A.C In both halves current throu	(d) zero	v.

1. The time period of the ripple at the output of the following circuit is:



2. In the following figure what happens for the negative half cycle of the input? (b) 20 ms



(a) D₁ and D₃ conduct D₁ and D₂ conduct

- D₄ and D₂ conduct
- (d) D4 and D3 conduct

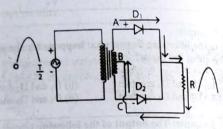
10 ms

# CENTER TAPE TRANSFORMER RECTIFIER

A center-tap transformer rectifier uses transformer with center-tapped secondary winding which splits the secondary voltage into two parts and two diodes which conduct alternatively.

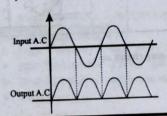
### During +ve half cycle:

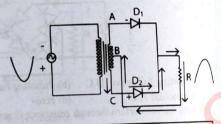
- ➤ Point A becomes +ve w.r.t B and diode D₁ becomes forward biased.
- Point C becomes -ve w.r.t B and diode D2 becomes reverse biased.
- > Only diode D₁ conduct the current.
- > Output is +ve pulse.



### During -ve half cycle:

- Point A becomes -v w.r.t B and diode D₁ becomes reversed biased.
- Point C becomes +ve w.r.t. B and diode D₂ becomes forward biased.
- > Only diode D₂ conducts the currents.
- > Output is a +ve pulse.





- If 'f' is frequency of input signal then output ripples have frequency '2f'
- If 'T' is time period of input signal then output ripples have time period 'T/2'

### Note

- A circuit which converts pulsating D.C into smooth D.C is called filter.
- Capacitor, inductor or their combination can be used as filter.

### Example:

If a full wave rectifier circuit is operating from 50 Hz mains, then the time period of output ripples will be:

- (a) 20 ms
- (b) 40 ms
- (c) 10ms
- (d) 30ms

#### Solution:

Input frequency = 50Hz Output ripple frequency =100 Hz

Output time period =  $\frac{1}{100}$  = 10ms

In case of center tape transformer full wave rectifier which of the following statement is true (b) only one diode conducts at a time (a) minimum two diodes are required

(c) frequency of output ripple is half of input signal

(d) all of these V

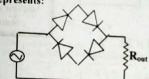
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	Half wave rectifier	Full wave bridge rectifier	Center tap transformer rectifier
Minimum of diodes required	1	4	2
Output ripple frequency	f	2f	2 <i>f</i>
Output ripple time period	T	$\frac{T}{2}$	$\frac{T}{2}$
Average output in a cycle	$\frac{V_o}{\pi}$	$\frac{2V_o}{\pi}$	2 <i>V</i> _o
Output rms value	$\frac{V_o}{2}$	$\frac{V_o}{\sqrt{2}}$	$\frac{\pi}{\frac{V_o}{\sqrt{2}}}$
Form factor	1.57	1.11	1.11
Ripple factor	1.21	0.48	0.48
Efficiency	40.6%	81.2%	81.2%

**ELECTRONICS** 

The following circuit represents:



- Half wave rectifier
- (c) Quarter wave rectifier

- Full wave rectifier Not a rectifier
- 2. In a full wave bridge rectifier, how many diodes conduct at a time?
- 3. If the time period of A.C source applied on the input of full wave rectifier is T₁ and time period of the output ripple is To, then the relation between these two is:
  - (a)  $T_0 = 2T_1$
- (b)  $T_0 = \frac{T_1}{\sqrt{2}}$

(b) Smooth

- 4. If a full wave rectifier circuit is operating from 50 Hz mains, then the time period of output 10 ms

UNIT 10

- 5. The output voltage of a rectifier is: (b) 40 ms (a) Straight line
- (c) 50 ms
- (d) 80 ms

Pulsating

(d) None of these

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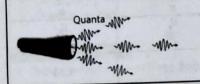
UNIT  $|11\rangle\rangle$ 

# **DAWN OF MODERN PHYSICS**

### Plank's Assumption:

"Energy is emitted or absorbed by atoms in discrete packets called quanta rather than as a continuous wave."

But according to classical electromagnetic theory of radiations energy was emitted or absorbed by atoms as a continuous wave. And energy is uniformly distributed over the wave.



Continuous Electromagnetic Wave



### Plank's Law:

Energy of each quantum is directly proportional to its frequency.

$$E \propto f$$

$$OR = hf$$

Note Angular momentum and Plank's constant have same units.

Where 'h' is plank's constant and

 $h = 6.626 \times 10^{-34} \text{ J.s or } h \approx 6.63 \times 10^{-34} \text{ J.s}$ 

- ➤ SI unit of Plank's constant is  $J.s = kgm^2s^{-1}$
- $\triangleright$  Dimensions of plank's constant are  $[ML^2T^{-1}]$

The graph between energy and frequency of photons is a straight line and its slope represent the Plank's constant.

- Atoms or molecules emit or absorb energy when they jump from one quantum state to another.

(Emitted or absorbed energy = difference in energy between two levels).



4hf	Tare .	100
3hf	to spaffer a	1410
2hf -	STATE OF STATE OF	1181
1hf -		
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DAWN OF MODERN PHYSICS

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### PHOTON THEORY

"According to Einstein photons (discrete energy packets) are integral part of all the electromagnetic radiations."

- > These photons carriers energy and momentum.
- Photon cannot be subdivided (elementary particle).
- Rest mass of photon is zero.
- Charge on the photon is zero. Hence they are not affected by electric and magnetic field.
- y-radiation with energy about 1 MeV. Their quanta can be easily detected.
- Radio waves with energy about 10⁻¹⁰ eV. Their quanta cannot be detected and wave property of radio waves predominates.

### Cnorgy of Photon:

Energy of photon in terms of frequency is given as	Energy of photon in terms of W velength is given as	Energy of photon in terms of momentum is given as
E = hf	$E = \frac{hc}{\lambda}$	E = pc
Eαf	$E \propto \frac{1}{\lambda}$	E∝p
Slope = h	E	Slope = c

Short cut formula to determine energy of photon :

$$E = \frac{1240 \times 10^{-9}}{\lambda} eV$$

### Example:

Energy of blue light photon having wavelength  $\lambda = 400nm$  is

(c) 1.2 eV

(b) 3.1 eV√ (d) 2.1 e V

**Solution:**  $E = \frac{1240 \times 10^{-9}}{400 \times 10^{-9}}$  $=\frac{12.4}{4}eV=3.1 eV$ 

### Example:

Which of the following radiations photon carries the most energy

(c) visible light

(b) microwaves

(d) x-rays√

Solution:

x-rays have shortest wavelength

 $E \propto \frac{1}{1}$ 



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**UNIT 11** 

### DAWN OF MODERN PHYSICS

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### Example:

Two photons have energies 2 eV and 4eV then the ratio between their wavelength is

(a) 1:2 (c) 1:1

(b) 2: 1√ (d) 1:4

Solution: Since  $E \propto \frac{1}{x}$ 

So ratio in wavelength will be inverse ratio of energies

### Momentum of Photon:

Momentum of photon in terms of frequency is given as	Momentum of photon in terms of wavelength is given as	Momentum of photon in terms of energy is given as	
$p = \frac{hf}{c}$	$p = \frac{h}{\lambda}$	$p = \frac{E}{c}$	
p∝f	$p \propto \frac{1}{\lambda}$	<i>p</i> ∝ <i>E</i>	
p d	p	Slope = c	

#### Number of Photons:

If a beam of light contain 'n' number of photons then total energy of the beam is given as

E = nhf

Or



Or

E = npc

Relation with frequency	Relation with wavelength	Relation between momentum
$n = \frac{E}{hf}$	$n = \frac{E\lambda}{hc}$	$n = \frac{E}{pc}$
If two beams have same $\text{Energy} \qquad n \propto \frac{1}{f}$	If two beams have same Energy $n \propto \lambda$	If two beam have same Energy $n \propto \frac{1}{p}$

- > Speed of photons in free space or vacuum is  $3 \times 10^8 ms^{-1}$
- > Speed of photons in a medium depends upon wavelength

v x l

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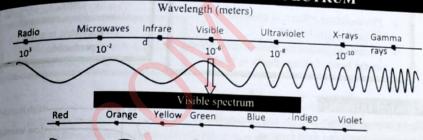
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### TROMAGNETIC WAVES SPECTRUM

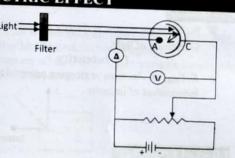


- Red has longest wavelengt' in visible region of spectrum
- · Violet has shortest wavelength in visible region of spectrum

### PHOTOELECTRIC EFFECT

"Emission of electrons from surface of Light metal when exposed to light of suitable frequency is called photo-electric effect".

> Emitted electrons are known as photo electrons and current due to photo-electrons is known as photoelectric current.



### topping Potential:

UNIT 11

- > By reversing the connections of battery (anode becomes -ve and cathode becomes +ve) electrons are reppelled by anode and photo-electric current decreases.
- > "Negative potential at anode at which photoelectric current becomes zero is called
- If V₀ is stopping potential then maximum K.E of electrons is given as

 $K.E_{max} = eV_o$ 

Example 1: If stopping potential is 0.25V then  $K.E_{max} = e(0.25V) = 0.25eV$ 

ری "e" گاری stopping potential کے کے K.  $E_{max} = \text{stopping potential}$ 

Example 2: If K.  $E_{max}$  of electrons is 0.12eV then  $V_o = \frac{0.12eV}{e} = 0.12V$ 

stopping potential = K. Emax المائدة والمائدة و

### **Information**

- > Photo-electric effect was observed by Heinrich Hertz in 1887.
- Einstein explained the photo-electric effect on the basis of photon theory in 1905.

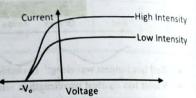
#### Note:

Inverse Phenomenon of photoelectric is x-ray production.

### Effect of Intensity:

By increasing intensity of light and keeping the frequency (or color)of light constant.

- > Photoelectric current increases.
- > K. Emax or stopping potential remains same.



### Conclusion:

> Photoelectric current is directly proportional to intensity of light.

### I & Intensity

➤ K. E_{max} of electrons or stopping potential are independent of intensity.



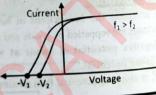
Intensity & Schange change of distance of cathode

Intensity  $\propto \frac{1}{(distance)^2}$ 

### Effect of Frequency:

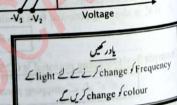
By increasing frequency of light while keeping the intensity constant.

- Photoelectric current remains same
- > K. Emax of electrons or stopping potential increases.

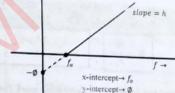


### Conclusion:

- > Photoelectric current is independent of frequency of light.
- Stopping potential increases by increasing frequency and decreases by decreasing frequency
- > K. Emax of electrons varies linearly with the frequency.



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- ▶ Below the threshold frequency K.E of electrons will be ve. Hence electrons will not be emitted from the metal (photoelectric effect does not occur ) however large the intensity of light may be.
- > Electrons are emitted from the metal surface(photoelectric effect does not occur) only when frequency of photon is equal or greater than threshold frequency

"Minimum frequency of light required to emit the electrons from surface of the metal is

### Cut off Wavelength: $(\lambda_c)$

Threshold Frequency (fo):

Note:

upon nature of the metal

Threshold frequency only depends

called threshold frequency."

UNIT 11

"Maximum wavelength of light required to emit the electrons from surface of the metal is called cut-off wavelength".

- Electrons are emitted from the metal surface(photoelectric effect does not occur) only when wavelength of photon is equal or less than cut off wavelength.
- > If wavelength of photon is greater than cut off wavelength ,electrons are not emitted from the metal surface (photo electric effect does not occur).

### Note:

Cut-off wavelength only depends upon nature of the metal.

$$\lambda_c = \frac{c}{f_o}$$

### Work function:(Ø)

"Minimum energy required to emit the electrons from the surface of metal is called work

### Note:

Work function only depends upon nature of the metal

- Electrons are emitted from the metal surface(photoelectric effect does not occur) only when Energy of photon is equal or greater than work function.
- If Energy of photon is less than work function , electrons are not emitted from the metal surface (photo electric effect does not occur).

	Metal	Work function (in eV)
1	Na	2.28
	Al	4.08
	Cu	4.70
	Zn	4.31
	Ag	• 4.73
	Pt	6.35
	Pb	4.14
	Fe	4.50

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> Relation between threshold frequency and work function is

$$\emptyset = hf_o$$

> Relation between cut-off wavelength and work function is

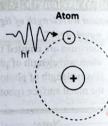
$$\emptyset = \frac{hc}{\lambda_c}$$

Short cut formula to determine work function from cut off wavelength OR cut off wavelength from work function is

$$\emptyset = \frac{1240 \times 10^{-9}}{\lambda_r} eV$$

### Einstein Explanation:

- > According to Einstein beam of light consists of stream of photons and energy of each photon is 'hf' and it only depends upon frequency.
- > According to Einstein: Intensity of light is directly proportional to number of photons.



Intensity & no. of photons

* By increasing intensity number of photons increases thus current increases.



- When a photon strikes an electron it transfers its energy to electron. Some amount of energy is used to remove the electron and rest amount of energy is given to electron as
- Einstein's photo electric effect equation is based on conservation of energy and is given as

$$hf = K.E_{max} + \emptyset$$
 OR  $K.E_{max} = hf - \emptyset$ 

$$K.E_{max} = hf - \emptyset$$

Where

$$K.E_{max} = eV_o$$
 and  $\emptyset = hf_o = \frac{hc}{\lambda_c}$ 

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- DAWN OF MODERN PHYSICS * By increasing frequency of light K.Emax increases thus stopping potential
  - $\star$  By increasing work function or threshold frequency  $K.E_{max}$  decreases thus stopping potential decreases and vice versa.

- (i). Increasing the energy or frequency of photon.
- the wavelength of (ii). Decreasing photon.
- (iii). By using a metal having larger work (iii). By using a metal having smaller function of threshold frequency.
- By using a metal having smaller cut off wavelength.

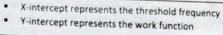
### $K.E_{max}$ and $V_o$ decreases by

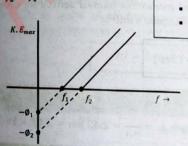
- (i). Decreasing the energy or frequency of photon.
- (ii). Increasing the wavelength of photon.
- work function of threshold frequency.
- (iv). By using a metal having larger cut off wavelength

#### For two different metals

> Slope of the graph remains same.

>	f2	>	f
			66

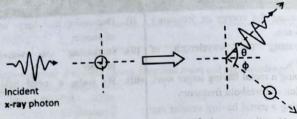




Condition	Result	
$f > f_o$ OR $E > \phi$ OR $\lambda < \lambda_c$	Photoelectric effect occur but I = 0	$K.E_{max} = 0$ $V_o = 0$
$f = f_0$ OR $E = \phi$ OR $\lambda = \lambda_c$	Photoelectric effect occur but I ≠ 0	$K.E_{max} \neq 0$
$f = f_0$ OR $E < \phi$ OR $\lambda > \lambda_c$	Photoelectric effect not occur	$K.E_{max}=0$

### COMPTON'S EFFECT

"When an x-ray photon is scattered from an electron the wavelength of scattered photon is greater that wavelength of incident photon" x-ray photon



- > When photon strikes with an electron it transfers some amount of its energy and momentum to electron that is why Scattered photon will have less energy, frequency and momentum than incident x-ray photon.( Wavelength of scattered photon is greater than incident photon )
- > Compton's effect is best evidence for particle nature of light (photon theory).
- > Change in wavelength between scattered and incident photon is called compton's shift.
- > By using law of conservation of energy and momentum formula derived for Compton's shift is and momentum formula derived for Compton's shift is

$$\Delta \lambda = \frac{h}{m.c} (1 - \cos \theta)$$

### Compton's Wavelength:

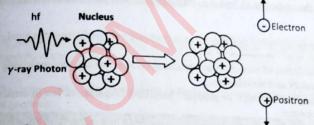
Quantity  $\frac{h}{m_o c}$  is known as Compton's wavelength  $\lambda_c = \frac{h}{m_o c} = 2.43 \ pm = 2.43 \times 10^{-12} m$ .

Scattering Angle	Compton's shift in terms of $\lambda_i$	Compton's shift in meter
00	$\Delta \lambda = 0$	$\Delta \lambda = 0$
90°	$\Delta \lambda = \frac{h}{m_o c} = \lambda_c$	$2.43 \times 10^{-12} m$
180°	$\Delta \lambda = 2 \left( \frac{h}{m_c c} \right) = 2 \lambda_c$	$4.86 \times 10^{-12} m$

 $\triangleright$  Compton's shift is maximum for  $\theta = 180^{\circ}$ 

### PAIR PRODUCTION

"When a high energy  $\gamma - ray$  photon interacts with a heavy nucleus a pair of particle and When a many nucleus a pair its anti-particle is produced this phenomenon is known as pair production".



- > In pair production a photon (energy) is converted into mass in accordance to Einstein equation  $E = mc^2$ . y + e+ + e-
- > A photon cannot create a single electron or positron alone because it will violate the law of conservation of charge.
- > Pair production cannot take place in vacuum (without interaction with nucleus) because it will violate the law of conservation of momentum. To conserve the momentum the pressure of nucleus is required.
- ▶ In order to create an electron-positron pair minimum energy  $2m_oc^2 = 1.02MeV$  is needed and surpless energy is given to electron and positron as K.E.

$$hf = 2m.c^2 + (K.E)_{e^-} + (K.E)_{e^+}$$

Minimum energy of photon required $E_{min} = 16.38 \times 10^{-14} I$	Minimum frequency of photon required	Maximum wavelength of photon required
$E_{min} = 16.38 \times 10^{-14} J$ = 1.02 MeV Example:	$f_{min} = 2.47 \times 10^{20} Hz$	$\lambda_{max} = 1.21 \times 10^{-12} m$

- Pair production can not take place in vacuum because it is against:
- (a) law of conservation of energy (b) law of conservation of charge
- (c) law of conservation of momentum
- (d) all of these

### Example:

UNIT 11

A gamma ray photon having energy 1.04 eV interacts with a heavy nucleus and an electron and positron are produced. The kinetic energy of produced electron will be:

- (a) 0.04 eV
- (c) 0.01 eV 🗸

- (b) 0.02 eV
- (d) 0.1 eV





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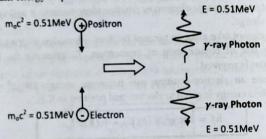
### ANNIHILATION OF MATTER

When a particle and its anti-particle combine with each other, they destroy each when a particle and two  $\gamma - ray$  photons ,this phenomenon is known as annihilation of matter."

> Mass is converted into energy in accordance to Einstein equation  $E=mc^2$ .

$$e^- + e^+ \longrightarrow \gamma + \gamma$$

- Annihilation of matter always produces two gamma ray photons having same energy frequency and wavelength.
- > Single photon cannot be produced because it is against the law of conservation of
- > Single electron or proton cannot be converted into energy because it is against the law of conservation of charge.
- Minimum energy of photon emitted is  $m_0 c^2$ .



### Note:

- > Existence of Anti-particle was predicted by Dirac in 1928.
- > Positron(Anti-particle of electron) was discovered by Anderson in 1932 from cosmic radiations

Minimum energy of photon	Minimum frequency of photon emitted	Maximum wavelength of photon emitted
$E_{min} = m_o c^2$	$f_{min} = \frac{m_o c^2}{h}$	$\lambda_{min} = \frac{h}{m_o c}$
$E_{min} = 8.19 \times 10^{-14} J$ = 0.51 MeV	$f_{min} = 1.23 \times 10^{20} \text{ Hz}$	$\lambda_{man} = 2.43 \times 10^{-12} m$

UNIT 12 >>

# **ATOMIC SPECTRA**

Spectroscopy:

The study of wavelength and intensity of electromagnetic radiations emitted or absorbed by atoms is called spectroscopy.

### Spectrum:

Set of all the wavelength of electromagnetic radiations emitted or absorbed by a substance is called spectrum.

ATOMIC SPECTRA

### TYPES OF SPECTRUM

### Line spectrum:

- > "Spectrum which consists of sharp lines with each line representing a specific wavelength emitted or absorbed by atoms is called line spectrum."
- Line spectrum is characteristics of emitting elements.
- > Line spectrum is due to transition of electrons between energy levels within an atom.
- > Each element has a unique set of energy levels, hence each element has a unique line
- > It is used to identify the gas or element.
- It is also known as atomic spectrum.

Line emission spectrum	Line absorption spectrum	
Line spectrum of electromagnetic radiations emitted by a substance is called emission line spectrum	Line spectrum obtained by	
Each line represents the energy or wavelength emitted by the substance	Each line represents the energy or wavelength absorbed by the substance	
Shows colored lines with a dark background		

land-spectrum:

"Spectrum which consists of group of lines so closely spaced that each group appears to be a band is called band spectrum or molecular spectrum."





For example: Nitrogen spectrum

> Band spectrum is produced when molecules radiate their rotational and vibrational energies.

### 2. Continuous-spectrum:

"Spectrum in which there is no gap or space between spectral lines is called continuous spectrum."

All the solids, liquids and very dense gases when heated produced continuous spectrum

### HYDROGEN EMISSION SPECTRUM

When hydrogen gas is placed in a discharge tube and high voltage is applied across the tube the gas starts glowing and give off bluish red light.

There were five types of series observed in emission spectrum of hydrogen atom

### Lyman Series:

- > Lyman series lies in ultraviolet region of spectrum.
- > Lyman series is produced when an electron jumps from higher energy level to 1st energy level.
- > The Rydberge formula for Lyman series is

$$\frac{1}{\lambda} = R_H \left( \frac{1}{1^2} - \frac{1}{n^2} \right)$$

Where n = 1,2,3,...

Minimum wavelength of Lyman series is produced when electron jumps from infinite to 1st shell of hydrogen atom

$$\lambda_{min} = \frac{1}{R_H} = 91 \, nm$$

Maximum wavelength of Lyman series is produced when electron jumps from 2nd to 15 shell of hydrogen atom.

$$\lambda_{max} = \frac{4}{3R_H} = 122 \, nm$$

### Balmer Series:

- > Balmer series lies in visible region of spectrum.
- Balmer series is produced when an electron jumps from higher energy level to 2nd energy level.
- > The Rydberge formula for Balmer series is

$$\frac{1}{\lambda} = R_H \left( \frac{1}{2^2} - \frac{1}{n^2} \right)$$

Where n = 2,3,4...

Maximum wavelength of Balmer series is produced when electron jumps from 3rd to 2nd shell of hydrogen atom.

$$\lambda_{min} = \frac{4}{R_H} = 365 \, nm$$

Minimum wavelength of Balmer series is produced when electron jumps from infinite to 2nd shell of hydrogen atom.

$$\lambda_{max} = \frac{4}{3R_H} = 656 \, nm$$

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### Paschan Series:

- > Paschan series lies in infrared region of spectrum.
- Paschan series is produced when an electron jumps from higher energy level to 3rd energy level.

ATOMIC SPECTRA

> The Rydberge formula for Balmer series is

$$\frac{1}{\lambda} = R_H \left( \frac{1}{3^2} - \frac{1}{n^2} \right)$$
 Where  $n = 4,5,6 \dots$ 

Minimum wavelength of Paschan series is produced when electron jumps from infinite to 3rd shell of hydrogen atom.

$$\lambda_{min} = \frac{9}{R_H} = 820 \, nm$$

Maximum wavelength of Balmer series is produced when electron jumps from 3rd to 2nd shell of hydrogen atom.

$$\lambda_{max} = \frac{144}{7R_H} = 1874 \, nm$$

### Bracket Series:

- > Bracket series lies in infrared region of spectrum.
- > Bracket series is produced when an electron jumps from higher energy level to 4th energy level.
- > The Rydberge formula for bracket series is

$$\frac{1}{\lambda} = R_H \left( \frac{1}{4^2} - \frac{1}{n^2} \right)$$
 Where  $n = 5,6,7 \dots$ 

Minimum wavelength of Bracket series is produced when electron jumps from infinite to 4th shell of hydrogen atom.

$$\lambda_{min} = \frac{16}{R_H} = 1458 \, nm$$

Maximum wavelength of Bracket series is produced when electron jumps from 5th to 4th shell of hydrogen atom.

$$\lambda_{max} = 4050 \, nm = \frac{400}{9R_H}$$

### Pfund Series:

- > Pfund series lies in infrared region of spectrum.
- Pfund series is produced when an electron jumps from higher energy level to 5th
- > The Rydberge formula for Pfund series is

$$\frac{1}{\lambda} = R_H \left( \frac{1}{5^2} - \frac{1}{n^2} \right)$$
 Where  $n = 6,7,8 \dots$ 

Minimum wavelength of Pfund series is produced when electron jumps from infinite to 5th shell of hydrogen atom.

$$\lambda_{min} = \frac{25}{R_H} = 2278 \, nm$$

Maximum wavelength of Pfund series is produced when electron jumps from 6th to 5th shell of hydrogen atom.

$$\lambda_{max} = \frac{900}{11R_H} = 7455 \, nm$$

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# BOHR'S MODEL

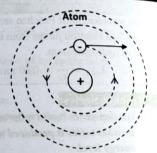
- > In order to explain emperical results obtained by Rydeberg formulated a model of hydrogen atom.
- > Bohr's model is semiclassical model based on following postulates.

According to classical physics an accelerating charge such as orbiting electron must continuously radiate electromagnetic energy.

## Postulate 1:

"Electron in an atom can move around nucleus in certain circular orbit without radiating. These orbits are called discrete stationary states of the atom."

Bohr's 1st postulate is contradiction of classical physics.



## Postulate II:

"Only those circular orbits or stationary states are allowed for which orbital angular momentum is an integral multiple of  $\frac{n}{2\pi}$ .

$$L=n\left(\frac{h}{2\pi}\right)$$

$$mvr = n\left(\frac{h}{2\pi}\right)$$

Where n is principle Quantum number and n = 1,2,3...

### Example:

What is the ratio between angular momentum of electron in 1st and 3rd shell of hydrogen atom

- (a) 1:3V
- (b) 3:1
- (c) 1:9
- (d) 9:1

### Example:

In which of the following shell the electron in hydrogen atom will highest angular momentum (d) N –shell  $(n=4)^{\checkmark}$ (c) M-shell (n=3) (b) L-shell (n=2)

## (a) K-shell (n=1)

Example: Angular momentum of electron in 3rd shell of hydrogen atom is

- (a)  $1.05 \times 10^{-34}$  J.s
- (b)  $2.10 \times 10^{-34} \text{J.s}$
- (c) 3.15 x 10⁻³⁴J.s
- (d)  $4.20 \times 10^{-34} \text{J.s}$

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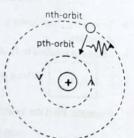
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UNIT 12	ATC	OMIC SPECTRA		7
Lirst shell	2 nd shell	3 rd shell	4 th shell	Zayan Publisher
	$L=2\left(\frac{h}{2\pi}\right)=2\hbar$	$L = 3\left(\frac{h}{2\pi}\right) = 3\hbar$	$L=4\left(\frac{h}{a}\right)=4h$	$5^{th} \text{ shell}$ $L = 5\left(\frac{h}{2\pi}\right) = 5\hbar$
$1.05 \times 10^{-34} J.s$	$2.1 \times 10^{-34} J.s$	$3.15 \times 10^{-34}$ J. s	$4.2 \times 10^{-34}$ J. s	$5.25 \times 10^{-34} I \text{ s}$

## Postulate III:

"When an electron jumps from high energy state E. to a low energy state Ep a photon of energy hf is emitted so that,"

$$hf = E_n - E_p$$



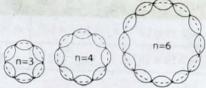
### De-Broglie's Interpretation

"According to De-Broglie electron in an orbit behave like a wave and produce stationary wave in the orbit. So length of orbit will be nh."

$$\ell = n\lambda$$

$$2\pi r = n\left(\frac{h}{mv}\right)$$

$$mvr = n\left(\frac{h}{2\pi}\right)$$



### Quantized Radii:

- > Electron can move in certain circular orbits.
- Radius of nth shell is given as

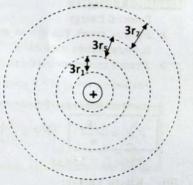
$$r_n = \frac{n^2 h^2}{4\pi^2 km e^2}$$

$$r_n \propto n^2$$

Short cut relation to find radius

$$r_n = n^2 r_1$$

where  $r_1 = 0.053 \, nm$ .



First shell	2 nd shell	3 rd shell	4 th shell	5 th shell
0.050	$r_2=4r_1$	$r_3 = 9r_1$	$r_4 = 16r_1$	$r_5 = 25r_1$
0.053 nm	0.212 nm	0.477 nm	0.848 nm	1.325 nm

As 'n' increases radius of orbit increases and distance between two consecutive orbits are also increases.

# Quantized Velocity:

Electron moving around the nucleus has discrete velocities.

> Velocity of electron in nth-shell is given as

$$v_n = \frac{2\pi k e^2}{nh} \Rightarrow v_n \propto \frac{1}{n}$$

> In moving from lower to higher shell velocity decreases

> Short-cut relation to find velocity

$$v_n = \frac{1}{n}$$
 Where  $v_1 = 2.19 \times 10^6 \text{ m/s}$ 

Example: Find the velocity of electron in 3rd shell

$$v_3 = \frac{v_1}{3} = \frac{2.19 \times 10^6}{3} m/_S = 7 \times 10^5 \, m/_S = 7 \times 10^5 \, m/_S$$

First shell	2 nd shell	, 3 rd shell	4 th shell	5 th shell
$v_1 = 2.19 \times 10^6$	$v_2 = 1.09 \times 10^6$	$v_3 = 7.3 \times 10^5$	$v_4 = 5.5 \times 10^5$	$v_5 = 4.4 \times 10^5$
$v_1 = 2.19 \times 10^6$	$v_2 = \frac{v_1}{2}$	$v_3 = \frac{v_1}{3}$	$v_4 = \frac{v_1}{4}$	$v_5 = \frac{v_1}{5}$

### Quantized Energies:

### (i). Potential Energy:

Electron posses P.E due to attraction between electron and nucleus.

> Electron moving around the nucleus

has discrete values of P.E given as:  $P.E_n = \frac{kq_1q_2}{r_n} = \frac{k(e)(-e)}{r_n} = \frac{-ke^2}{r_n}$ 

> Short relation to find P.E is

$$P.E_n = \frac{-2E_o}{n} \qquad \left(P.E \propto \frac{1}{n^2}\right)$$

Where  $E_o = 13.6 \, ev$ 

## Kinetic Energy:

- Electron posses kinetic energy due to its motion.
- Electron moving around nucleus has discrete values of K.E.

$$K.E_n = \frac{1}{2}mv_n^2 = \frac{ke^2}{2r_n}$$

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Note

Orbital electrons have specific amount

of energies where as free electron can

Note

By increasing n P.E increases.

have any amount of energy

### ATOMIC SPECTRA

> Short cut relation to find K.E is

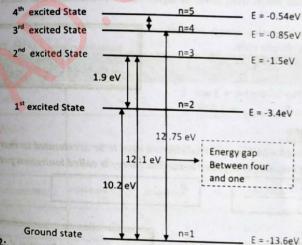
$$\boxed{K.E_n = \frac{E_o}{n^2}} \Rightarrow \boxed{K.E_n \propto \frac{1}{n^2}}$$

# (iii). Total Energy:

- T.E of electron is given as  $E_n = P \cdot E_n + K \cdot E_n = \frac{-ke^2}{r_n} + \frac{ke^2}{2r_n} = \frac{-ke^2}{2r_n} = \frac{-2\pi k^2 me^4}{n^2 k^2}$
- > Short relation to find energy of electron

$$E_n = \frac{-E_o}{n^2} \qquad \left( E_n \propto \frac{-1}{n^2} \right)$$

- > Ratio between K.E and total energy of electron is always 1: -1
- Ratio between K.E and total energy of electron is always 2:1
- Ratio between K.E and P.E energy of electron is always 1: -2



## Example 2:

P.E of electron in ground state will be.

(a) 13.6 eV

(b) -13.6 eV (c) -27.2 eV

Answer:

(d) zero eV

For ground state n = 1 and E = -13.6eVso P.E = 2(-13.6eV) = -27.2eV

Example 1: What is K.E of electron in 1st excited state.

(c) 10.2 eV

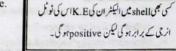
(b) 3.4 eV

Answer:

(d) 12.1 Ev

For  $1^{st}$  excited state n = 2 and E = -3.4eV so K.E = +3.4 eV

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ATO	MIC SPECTRA	The state of the s	Zayan Pub
	3 rd shell	4 th shell	5 th shell
$-E_o$	$-E_o$	$\frac{-E_o}{}$	-E _o
4	9	16	25
-3.4 ev	-1.51 ev	-0.85 ev	-0.54 ev
	$\frac{2^{nd} \text{ shell}}{4}$	$\frac{-E_o}{4} \qquad \frac{-E_o}{9}$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$

## Ionization Energy:

"Energy required to remove the electron from an atom is called ionization energy."

- > It is the energy required to make the electron jump from present state to infinite State
- > Ionization energy of electron in nth shell is given as

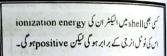
$$E_{ionization} = \frac{+E_o}{n^2}$$

$$E_{ionization} = \frac{13.6 \, ev}{n^2} \quad \left( E_{ionization} \propto \frac{1}{n^2} \right)$$

> When an electron jumps from lower to higher orbit 'n' increases and ionization energy decreases.

Example 3: What is ionization energy of electron moving in M-shell of hydrogen atom.

- > (a) 13.6 eV
- (b) 3.4 eV
- > (c) 1.5 eV
- (d) 12.1 eV
- For M-shell n = 3 and > Answer:
- $E = -1.5 \, eV$  so  $E_{ionization} = 1.5 \, eV$



ionization Potential کے shell

ionizationری کے برابر ہو گائی remove کرویں۔

### Ionization Potential:

"Potential through which an external electron need to be accelerated so that on collision with bound electron it may supply required ionization energy is called ionization potential."

$$V_{ionization} = \frac{E_{ionization}}{e}$$

$$E_{ionization} = e V_{ionization}$$

### Example 4:

Minimum potential required to accelerate an external electron so that it may knock out the electron for 1st excited state.



(b) 3.4 V

(c) 1.5 eV

(d) 1.5 V

For 1st excited state n = 2 and E = -3.4 eV

so 
$$E_{ionization} = 3.4 \text{ eV}$$
 and  $V_{ionization} = 3.4 \text{ V}$ 

## Excitation Energy:

- > "Energy required to make the electron jump from lower state to higher energy state is called excitation energy."
- Minimum energy required to excite an atom is called excitation energy

$$E_{\text{excitation}} = E_{\text{final}} - E_{\text{initial}}$$

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ATOMIC SPECTRA

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Energy required to excite the hydrogen atom from ground state (n = 1) to  $2^{nd}$ excited state (n = 3) is

- (a) 10.2 eV

- (d) 3.4 eV
- (c) 12.1 eV

 $E_{\rm exc} = 13.6 - 1.5 = 12.1 \, eV$ 

Answer: **Excitation Potential:** 

"Minimum potential through which an external electron need to accelerated so that on collision with bound electron it may supply the required energy is called excitation potential."

$$V_{excitation} = \frac{E_{excitation}}{e}$$

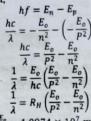
Example 6: Minimum potential required to excite the atom from ground state to first excited state is

- (a) 10.2 V
- (b) 1.5 V
- (c) 12.1 V
- (d) 3.4 V

Quantity	Relation .	Electron jumps from lower to higher state	Electron jumps from higher to lower state
Radius	$r_n = n^2 r_1$	Increases	Decreases
Velocity	$V_n = \frac{V_1}{n}$	Decreases	Increases
Momentum	$P_n = \frac{mV_1}{n}$	Decreases	Increases
Angular momentum	$L_n = n\left(\frac{h}{2\pi}\right)$	Increases	Decreases
K.E	$K.E_n = \frac{+E_o}{n^2}$	Decreases	Increases
P.E	$P.E_n = \frac{-2E_o}{n^2}$	Increases	Decreases
Total Energy	$E_n = \frac{-E_o}{n^2}$	Increases	Decreases
Ionization Energy	$I.E_n = \frac{+E_o}{n^2}$	Decreases	Increases
Excitation Energy	$E_{ex} = E_n - E_p$	Decreases	Increases
Time Period	$T_n \propto n^3$	Increases	Decreases

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When an electron jumps from high energy state  $E_n$ to a low energy state  $E_p$  a photon of energy hf is emitted so that,



nth-orbit

P=4

Paschan n=3 Balmer ____ n=2

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Series Name	Transition From Higher shell to	Maximum Wavelength	Minimum Wavelength	Region
Lyman	$1^{st}$ shell $P = 1$	$\lambda_{max} = \frac{4}{3R_H}$ $= 122 nm$	$\lambda_{min} = \frac{1}{R_H}$ $= 91 nm$	Ultraviolet
Balmer	$2^{\text{nd}}$ shell $P=2$	$\lambda_{max} = \frac{36}{5R_H}$ $= 656.1  nm$	$\lambda_{min} = \frac{4}{R_H}$ $= 365 nm$	Visible
Paschan	3 rd shell P = 3	$\lambda_{max} = \frac{144}{7R_H}$ $= 1874  nm$	$\lambda_{min} = \frac{9}{R_H}$ $= 820  nm$	Infrared
Bracket	4 th shell P = 4	$\lambda_{max} = \frac{400}{9R_H}$ $= 4050  nm$	$\lambda_{min} = \frac{16}{R_H}$ $= 1458  nm$	Infrared
Pfund	5 th shell P = 5	$\lambda_{max} = \frac{900}{11R_H}$ $= 7455  nm$	$\lambda_{min} = \frac{25}{R_H}$ $= 2278 nm$	Infrared

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# UNIT 13 $\rangle$

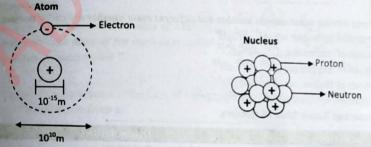
# **NUCLEAR PHYSICS**

- Rutherford discovered the nucleus and protons.
- Rutherford predicted the existence of neutrons
- Chadwick discovered the neutrons.

## Atomic Nucleus:

"At the center of each atom there is massive and positively charged nucleus containing protons and neutrons."

- About 99.9% mass of an atom is concentrated in the nucleus.
- > Size of nucleus is  $10^4 10^5$  times smaller than atom.
- > Volume of nucleus is  $10^{12} 10^{15}$  times smaller than atom.



## nified atomic mass unit:

"One twelveth of mass of carbon-12 is called unified atomic mass unit."

$$1u = \frac{\text{mass of C} - 12}{12} = 1.6606 \times 10^{-27} kg$$

Mass of proton =  $1.673 \times 10^{-27} kg = 1.007276u$ Mass of neutron =  $1.675 \times 10^{-27} kg = 1.008665u$ 

Mass of electron =  $9.1 \times 10^{-31} kg = 0.00055u$ 

# Atomic Number:

"The number of protons in a nucleus is called atomic number."

- Elements are identified by their atomic number.
- Atomic number is also known as charge number and it identify the charge of nucleus.

Charge = Ze

For Example atomic number of alpha particle is 2 so its charge will be (+2e).

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## Mass Number:

"The total number of protons and neutrons in a nucleus is called its mass number"

"The total number of problems of the nucleus for example mass number of oxygen is 16 so its mass will be 16u.

$$A = Z + N$$

## Symbol of Nucleus:

Nucleus is represented by symbol  $zX^{A}$ .

> Superscript 'A' represents the mass number of total number of nucleus in the nucleus.

> Subscript 'Z' represents the atomic number or total number of protons in the nucleus. For example symbol for uranium is ²³⁶₉₂U

No. of nucleus = 238  
No. of protons = 92  
No. of neutrons = 
$$238 - 92 = 146$$

### Isotopes:

"Atoms having same atomic number but different mass number are called isotopes."

- > Isotopes of hydrogen are 1H1, 1H2, 1H3
- > Isotopes of carbon are 6C12, 6C13, 6C14
- ➤ Isotopes of oxygen are 80¹⁶, 80¹⁷, 80¹⁸
- > Isotopes of Helium are 2He3 and 2He4
- ➤ Isotopes of Neon are 10Ne²⁰, 10Ne²¹, 10Ne²²
- > Cesium and Xenon have 36 isotopes.

-1.15	Similarities		Dissimilarities
(i).	Same atomic no.	(i).	Different mass no.
(ii).	Same no. of protons	(ii).	Different no. of neutrons
(iii).	Same no. of electrons	(iii).	Different mass
(iv).	Same chemical properties	(iv).	Different physical
(v).	Same position in periodic table	No. of the last	

## Isobars:

"Nuclei having same mass no. but different atomic no. are called isobar."

- > 1H3 and 2He3 are isobars.
- C14 and 7N14 are isobars.

## Isotones:

"Nuclei having same no. of neutrons are called isotones."

- > 6C¹³ and 7N¹⁴ are isotones.
- H³ and 2He⁴ are isotones.





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UNIT 13

sodiphers.

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"Nuclei for which the difference between neutrons and protons is same are called

NUCLEAR PHYSICS

isodiphers." Example:  $_{6}H_{7}^{3}$  (2 - 1 = 1) and  $_{6}H_{7}^{13}$  (7 - 6 = 1) are isodiphers.

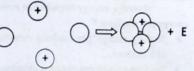
# Mass Spectrograph:

"Mass spectrograph is a device which is used to separate the isotopes and to determine their masses and abundances."

- Charged isotopes are accelerated through p.d.V they gain K.E = qV and  $V = \sqrt{\frac{2qV}{m}}$
- Then they are projected in magnetic field which exerts a deflecting force which bends in a circular path of different radii depending on their masses,  $r \propto \sqrt{m}$
- By measuring their masses by using the relation

### Mass-defect:

"The difference between total mass of nucleus and experimental mass of the nucleus is called mass defect or mass deficit."



> Loss in mass appears in the form of energy according to Einstein's Equations  $E = \Delta mc^2$ . Mass-defect is given as

$$\Delta m = Zm_p + (A - Z)m_n - m_{Nucleus}$$

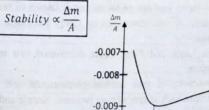
Mass-defect increases from H to U

( Somass-defect of JEll or Nucleus 17 te)

$$\Delta m = 2m_p + 2m_n - m_{He}$$

# Mass-defect per nucleon: $\left(\frac{\Delta m}{\Delta}\right)$

- Mass-defect per nucleon is also known as packing fraction.
- Mass-defect per nucleon or packing fraction measures the stability of a nucleus.



- increases from H to Fe  $\frac{\Delta m}{A}$  is maximum for 26Fe
- decreases from Fe to U

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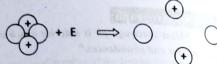
## Binding Energy.

"Energy required to break the nucleus into its constituents protons and neutrons is called binding energy."

> Energy appears in increase in mass.

> Binding energy of a nucleus is given as

$$E_B = \Delta mc^2$$



$$E_B = [Zm_p + (A - Z)m_n - m_{Nucleus}]c^2$$

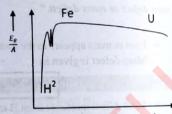
> Binding energy increases from H to U.

(جنابزا Nucleus مو كاتن زادواكل binding از قي موكا-)

## Binding Energy Per Nucleon:

"Average energy required to remove a single nucleon from the nucleus is called binding energy per nucleon."

- > Binding energy per nucleon measures the stability of a nucleus.
- > Binding energy per nucleon increases from H to Fe.
- $\triangleright$  Binding energy per nucleon is maximum for  $\frac{E_B}{}$ (26Fe⁵⁶) and its value is 8.8 Mev.
- > Binding energy per nucleon decreases from Fe to U.
- > For U²³⁸ binding energy per nucleon curve rises, products are more stable than reactants and energy is emitted (e.g. fission and fusion).



## RADIOACTIVITY

"Unstable isotopes or elements emit radioations spontaneously these elements are known as radioactive elements and this phenomenon is known as radioactivity."

- > Radioactivity was discovered by Henry Becquaral in 1896 by observing radiations from
- Marrie Curie and Piere Curie discovered two new radioactive elements radium and polonium.
- Radioactivity is pure nuclear phenomenon and it is independent of other physical conditions such as temperature pressure, electric and magnetic field etc.

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## **NUCLEAR PHYSICS**

# types of radiations:

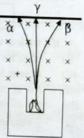
## In presence of electric field > Radiations are of three types $\alpha$ , $\beta$ and $\gamma$ .

- v-rays pass straight showing that they are neutral
- » β-rays are deflected towards +ve plate showing that they are negatively charged.
- > α-rays are less deflected showing that they are massive and B-rays are more deflected showing that they are lighter.

## In presence of magnetic field:

- > v-rays are not deflected by magnetic field because they are
- $\triangleright \alpha$  and  $\beta$  rays are deflected in opposite directions because they are oppositely charged.
- $\triangleright \alpha$  is less deflected than  $\beta$  because  $\alpha$  is massive than  $\beta$ .

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### Properties of rays:

Features	α-rays	$\beta$ -rays	γ-rays
Nature	Helium Nuclei	Electrons or positrons	E.M. photons
Typical source	Radon-222	Strontium-94	Cobalt-60
Mass No.	A = 4	A = 0	A = 0
Charge No.	Z = 4	Z = -1  or  + 1	Z = 0
Mass	4u or 4mp	m _e	Mass less
Charge	+2e	-e or +e	zero
Speed	~10 ⁷ m/s	~10 ⁸ m/s	$\sim 3 \times 10^8 m/s$
Penetration power /Range (in air) Ionizing ability	Several centimeter	Several meter	Obey inverse square law
ons in pair in air per mm)	~104	~102	~1
Energy spectrum Effect of electric or	Line and discrete	Continuous	Line and discrete
magnetic field	Deflected	Deflected	Not deflected
Absorbed by	A paper	1-5 mm Al sheet	1-10 cm of lead sheet

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# NUCLEAR TRANSMUTATION

"Conversion of parent nucleus into a daughter nucleus by emission of radiations is called nuclear transmission or nuclear decay or nuclear disintegration."

$$_{z}X^{A}(parent) \rightarrow _{z'}Y^{A'}(daughter) + radiations$$

## α-decay:

- > Alpha decay occurs with nuclei that are too large to be stable.
- > Alpha decay is caused by coulomb repulsion.
- $\triangleright$  General reaction for  $\alpha$ -decay is

$$_{z}X^{A} \rightarrow _{z-2}Y^{A-4} + He_{2}^{4}$$

- > If a nucleus emits an alpha particle its
- Mass No. decreases by 4.
- Atomic No. decreases by 2. (ii).
- No. of protons decreases by 2. (iii).
- No. of neutrons decreases by 2. (iv).
- $\frac{N}{2}$  ratio increases. (v).

## B-decay

- > Beta decay is caused by weak nuclear force.
- $\triangleright$  There are three types of  $\beta$ -decay
  - (i) ve beta  $(\beta^-)$  (ii) +ve beta  $(\beta^+)$
- $\triangleright$  General reaction for  $\beta^-$  is

$$_{z}X^{A} \rightarrow _{Z+1}Y^{A} + e_{-1}^{0} + \bar{\nu}$$

- $\triangleright$  If a nucleus emits a  $\beta^-$  particle its
- Mass No. remain same. (i).
- Atomic No. increases by one.
- No. of neutrons decreases by one.
- No. of protons increase by one

## Positive Beta decay:

 $\triangleright$  General reaction for  $\beta^+$  is

$$_{\rm Z}{\rm X}^{\rm A} \rightarrow _{{\rm Z}-1}{\rm Y}^{\rm A} + e^0_{+1} + \upsilon$$

- $\triangleright$  If a nucleus emits a  $\beta^+$  (positron) its
- (i). Mass No. remains same.
- (ii). Atomic No. decreases by one
- No. of protons decreases by one. (iii).
- (iv). No. of neutrons increases by one.

(iii) electron capture

### Note

β is due to neutron decay into a proton, electron and anti-neutrino  ${}_{0}^{1}n \rightarrow {}_{1}^{1}H + e_{-1}^{0} + \bar{v}$ 

### Note

 $\beta^+$  is due to proton decay into a neutron, positron and anti-neutrino  $\frac{1}{0}n \rightarrow \frac{1}{1}H + e_{+1}^{0} + \nu$ 

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# lectron capture:

For few nuclei electron usually from K-shell

is captured by nucleus

$$\mathbf{z}^{\mathsf{X}^{\mathsf{A}}} + e^{\mathsf{0}}_{-1} \to \mathbf{z}_{-1}^{\mathsf{Y}^{\mathsf{A}}} + \nu$$

- > If a nucleus captures an electron its
- Mass No. remains same.
- Atomic No. decreases by one
- No. of protons decreases by one. (iii).
- No. of neutrons increases by one (iv).

### Note

Neutrino (v) and anti-neutrino  $(\bar{v})$ have zero charge and approximately zero mass.

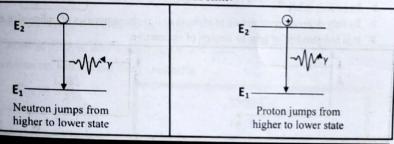
## Gamma Decay:

Gamma rays are photons just like ultraviolet and X-rays and only differs on the basis of its origin

- As there are energy levels 10.1 electrons in an atom similarly there are energy levels for nucleons in a nucleus.
- > Energy gap between nuclear levels are of order of MeV but in case of atoms energy gaps are only few electron volt.
- > When a nucleus is excited (a nucleon jumps from low energy state to higher energy state) it can decay to ground state by emission of v-ray photon.
- > General reaction for y-decay is

$$_{Z}X^{A} \rightarrow _{Z}X^{A} + \gamma$$

Mass No. and atomic No. of the nucleus remains same



## HALF LIFE

"Time in which half no. of radioactive element decay is called its half life"

# Random process:

A process without defined pattern, rule or method is called random process. Nuclear decay is random process because it is unpredictable that which atom when will decay.

# Spontaneous Process:

A process occurring without apparent external cause is called spontaneous process. Nuclear decay is spontaneous process it cannot be speeded up or slowed down by physical and chemical means.

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UNIT 13 Since individual disintegrations are random, however the probability of decay (half_life) in a sample has fixed value which is characteristic of that material.

- a sample has fixed value and completely decay or infinite time is required for all the atoms to decay".
- 2. Rate of decay: According to Rutherford and Soddy law for radioactive decay:
  - "Rate of decay of an element at any instant is directly proportional to number of atoms present at that instant". (ve sign - يه ظاہر كرتى ب ك atoms كى تحداد كم بورى ب-)

$$\frac{\Delta N}{\Delta t} \propto -1$$

$$\frac{\Delta N}{\Delta t} \propto -\lambda N$$

If  $N_0$  are number of atoms at t = 0 then number of atoms at any instant t are given as

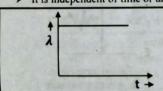
$$N=N_o e^{\lambda t}$$

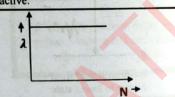
## Decay Constant ( $\lambda$ ):

"Fractional decay per second is known as decay constant or disintegration constant."

$$\lambda = \frac{\Delta N/N}{\Delta t}$$

- > Its SI unit is sec-1.
- > Its only depends upon nature of element or it is characteristics of radioactive element.
- > It is independent of time or amount of radioactive.



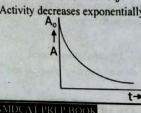


Activity: "No. of disintegrations per second is called activity or rate of decay."

 $A = \lambda N$ 

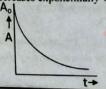
OR  $A = A_0 e^{-\lambda t}$ 

Activity decreases exponentially with time.



OR  $R = R_0 e^{-\lambda t}$ Rate of decay decreases exponentially with

 $R = \lambda N$ 



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**NUCLEAR PHYSICS** Activity or rate of decay depends upon time, No. of atoms and nature of radioactive element. SI unit of activity is Becquaral: 1 Bq = one disintegration per sec

- > A common unit of activity is curie:  $1Ci = 3.7 \times 10^{10} Bq = 3.7 \times 10^{10}$  disintegration per sec

## Half life:

- > Half life of a radioactive element only depends upon nature of element and independent of time and no. of atoms.
- After each half life no. of atoms will become half of its initial value.

No of half lives	1	2	3	4	5
	$\frac{1}{2}$	$\frac{1}{4}$	1 8	$\frac{1}{16}$	1 32
	$\frac{1}{2}$	3 4	$\frac{7}{8}$	15 16	31 32

(اوروالے table کیدرے اگر half-life کی تعداد دی ہو ق fraction مطوم ر سكت بين بااكر fraction دى مو تو half-life كي تعد اد معلوم كر سكت بين

### Note

One curie is approximately equal to activity of one gram of radium.

If 't' is total time for 'n' half lives then

$$t = nT_{1/2}$$

- No. of atoms of undecayed after nth half life:  $N = \frac{N_o}{2^n}$
- No. of atoms of decayed after nth half life:  $N = \frac{(2^n 1)N_0}{2^n}$
- > Relation between half life and decay constant is

$$T_{1/2} = \frac{l_n(2)}{\lambda}$$

$$T_{1/2} = \frac{0.0693}{\lambda}$$

 $T_{1/2}=rac{1}{\lambda}$  اگر دونوں شی سے کوئی ایک معلوم ہو تو اس فار مولے ہے دوسری کو معلوم کریں۔

## Mean life:

Time in which 63% of a radioactive element is decayed is known as mean life.

mean life =  $T^* = \frac{1}{1}$ 

- $T^* = \frac{T_{1/2}}{0.693} = 1.44 \, T_{1/2}$
- Mean life is about 44% more than half life.

NUCLEAR PHISICO			Zayan Pai
T 13	Half life	Isotope	Zayan Pul Half life
Uranium-238	$4.5 \times 10^9$ years	Sodium-24	15 hours
Radium-226	1620 years	Iron-59	45 days
Uranium-239	23.5 minutes	Technetium-99	6 hours
Radon	3.8 days	Iodine-125	60 days
Iodine-131	8 days	Plutonium	24000 yea

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## RADIATION EXPOSURE

## Back ground radiations:

- > "Radiations present in the environment whose source unknown is are called back ground radiations."
- Background radiations varies from place to place.
- > Source of background radiation are
  - Cosmic radiations
  - · Radioactive substance in earth's crest.
  - Building materials containing small amount of radioactive substance.
  - · Radioactive radon gas enters buildings from ground.
  - · All types of food contain small amount of radioactive substance common are potassium-40 and carbon-14 isotopes.
  - Radiations added in environment by human activities such as medical practices diagnostic x-rays.
  - · Other sources include radioactive waste from nuclear facilities, hospitals and research centers, colour T.V, luminous watches and tobacco leaves

## osmic Radiations:

"Radiations coming from outer space to earth in form of high energy electromagnetic radiations and charged particles are called cosmic rays."

- > Atmosphere acts as a shield to absorb some of these radiations.
- > Ozone layer absorb ultraviolet radiations which causes eye and skin diseases.
- Recently a depletion in ozone layer was observed due to a chemical chloro-floro carbon which is used in aerosol sprays, refrigeration, paints and foam industry.

# BIOLOGICAL EFFECTS OF RADIATIONS

## Absorbed dose:

"The energy E absorbed from ionzining radiation per unit mass m of the of absorbing body is called absorbed dose."

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### NUCLEAR PHYSICS

is SI unit is gray  $(1Gy = 1Jkg^{-1})$ .

Its old unit is "rad" (radiation absorbed dose)

 $1 \, rad = 0.01 \, Gy \, or \, 1 \, Gy = 100 \, rad$ 

Equal dose of different radiations don't produce same biological effect

Biological effect depends upon two factors

- 1. Types of radiation
- 2. The part of body absorbing radiation.
- Neutrons are more damaging to eyes than other parts of body.
- For same absorbed dose α-rays are 20 times more damaging than x-rays.

## Equivalent Dose:

"The product of absorbed dose and RBE (relative biological effectiveness) of the kind of radiation being absorbed is called equivalent dose."

$$D_e = D \times RBE$$

- It's SI unit is sievert (Sv):  $1Sv = 1 Gv \times RBE$
- > It's old unit is "rem" (Rontgen equivalent mass)

$$1 rem = 0.01 Sv$$
 or  $1 Sv = 100 rem$ 

- > Background radiation to which we expose on average is 2mSv per year.
- > Doses of 3Sv will cause radiation burn to the skin weekly dose of 1mSv is consider to be safe for the workers of nuclear facilities or mines

Dosage in microsiervert	Effect	Dosage in microsievert	Effect
1×10 ⁶	Radiation sickness	$2.5 \times 10^{6}$	Sterility for about two years
1.5 × 10 ⁶	Temporary low fertility	4 × 10 ⁶	Death of 60% of people exposed

- $\triangleright$  The damage from  $\alpha$ -particle is small until it enters the body.
- $\alpha$  and  $\beta$  particles cause redness and sores on the skin.

Low level radiation effects	High level radiation effect
<ul> <li>Loss of hair</li> <li>Ulceration</li> <li>Stiffening of lungs</li> <li>Drop in white blood cells which results in sickness pattern of diarrhea, vomiting and fever known as radiation sickness.</li> </ul>	<ul> <li>Disrupt blood cells seriously lead to anemia and leukemia</li> <li>Chromosome abnormalities or mutation may cause delayed genetic effects such as cancer and eye cataracts and abnormalities in future generation.</li> </ul>

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# BIOLOGICAL AND MEDICAL USES OF RADIATIONS

- > Radioisotopes are used to find out what happens in many complex chemical reactions and how they proceed.
- how they proceed.

  In biological, they have helped in investigating into chemical reactions that take place in plants and animals.
- Radio active isotopes are used to determine proper amount of fertilizer taken up by plant.
- Radio active isotopes are constructed by plant.
   Radiation induced mutation improved varieties of crops. Such as rice, chickpea, wheat and

## Radio active Tracer:

"Tracer technique is to substitute radioactive atoms for stable atoms of same kind and then follow the radioactive atoms with the help of radiation detector. These radioactive elements are known as radioactive tracers."

- > In medicine, tracers are used to detect malignant tumors.
- > In agriculture, tracers are used to study the uptake of a fertilizer.
- > Tracers are used to identify faults in underground pipes.

Radioactive Element	Isotope	Use in medicine
Iodine	I-131	Mostly absorbed in thyroid gland  : Hyper active gland absorb more than twice amount of iodine than normal gland  • Used for treatment of thyroid gland cancer
Phosphorous	P-32	Mostly absorbed by bones used for treatment of skin cancer.
Cobalt	Co-60	Mostly absorbed by liver used for treatment of cancer.
Sodium	Na-24	It is uniformly disturbed throughout the body and used to study the circulation of blood.
Strontium	Sr-90	Used for treatment of skin cancer.

The γ-rays radiograph is used in medical diagnosis such as internal imaging of brain and determine precisely the size and location of tumors.

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## BASIC FORCES OF RADIATIONS

- Basic forces of nature are:
  - 1. Gravitational force
  - 2. Magnetic force
  - 3. Electric force
  - 4. Weak nuclear force
  - 5. Strong nuclear force

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> Electric and magnetic forces were united to get an electro magnetic force by Faraday and

**NUCLEAR PHYSICS** 

- In 1979, Glashow Weinberg and Abdus Salam shared Nobel prize for the unification of electromagnetic and weak force (electroweak force).
- It is expected that strong nuclear force will unite with electro weak force resulting in grand unified electroweak force.

Force	Nature	Range	Carrier particles	Relative strength	Effect
Gravitational	Attractive	Long range infinite (obey inverse square law)	Gravitone (not yet discover)	10-38	Binds the masses with each other such as stars and galaxies Responsible for binding the satellite, atmosphere and set with the earth
Weak nuclear	Repulsive	Short range (~10 ⁻¹⁷ m)	W+, W-, Z· (Bosons)	10-13	<ul> <li>Responsible for spontaneous breaking up of radioactive element.</li> <li>Responsible for β⁺and β⁻decay</li> </ul>
Electro magnetic	Attractive or repulsive	Long range or infinite (obey inverse square law)	Photons	10 ⁻²	<ul> <li>Binds together atoms, molecules, crystal, trees</li> <li>Responsible for various macroscopic forces such as friction, adhesion, cohesion etc.</li> </ul>
Strong nuclear	Attractive	Short range (~10 ⁻¹⁵ m)	Gluons	ons and by comic port os ed esist nomic por Baryons	<ul> <li>Effective only within subnuclear distances.</li> <li>Binds the neutrons and protons within the nucleus.</li> <li>Responsible for binding planets with the sun.</li> </ul>

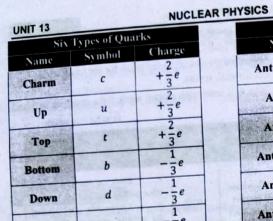
## Quarks:

- All photons quarks leptons are elementary particles.
- Hadrons are not elementary particles but are composed of quarks.

wies which don't experience strong nucleur h

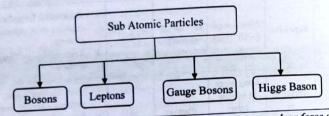
- According to quark theory by M. Gell Mann and G. Zweig the quarks are basic building block of mesons and baryons.
- It is proposed that there are six quarks
  - 2. Down 3. Strange
    - 5. Bottom 6. Top

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Strange

Six Type	s of anti qua	rks
Name	Symbol	Charg
Anti Charm	Ē	$-\frac{2}{2}e$
Anti Up	ū	$-\frac{2}{3}e$
Anti Top	ī	$-\frac{2}{3}e$
Anti Bottom	Б	$+\frac{1}{3}e$
Anti Down	đ	$+\frac{1}{3}e$
Anti Strange	<u>\$</u>	$+\frac{1}{3}e$



	and strong nuclear force are called
	"Subatomic particles which experience strong nuclear force are called
	hadrons".
	Hadrons consist of quarks.
	Example: mesons and baryons
	Mesons: Subatomic particles naving mass less denti quark
Hadrons	Mesons: Subatomic particles having in quark and anti quark. mesons. Mesons consists of a pair of quark and anti quark. mesons of a pair of quark and anti quark.
	Proton and neutron are baryons
	Proton and neutron are baryons  "Subatomic particles which don't experience strong nuclear force are called
	lepions .
Leptons	don't consist of quarks
	don't consist of quarks  Example: electrons muons, tau and their associated neutrino  "Gauge Bosons are exchange particles or carriers of basic forces of nature".  Example: photons are carriers of electromagnetic force
	"Gauge Bosons are exchange particles of carriers of
Gauge Bosons	Classes are carriers for strong nuclear force.
Gauge Bosons	of electro-weak lold
	W, W, Z Bosons are consistent force
	Gravitons are carrier of gravitational force  Higgs Bosons are discovered in July 2012, provides an explanation for how the other particles get mass by interacting with it.  **Bosons are carrier of credeta.**  **The other particles get mass by interacting with it.**
Hinns Doson	Higgs Bosons are discovered in July 2012, provide it
Higgs Boson	the other particles get mass by interacting with it.
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PRACTICE BOOK

Sr.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49. 50.
Ans:		d	a	d	c	a	b	b	c	a

Projectile motion has acceleration at each point of trajectory: (a) Variable (b) Constant (c) Zero projectile motion of object on earth is always (d) None of these (a) Linear (b) Parabolic (c) Circular (d) None of these Average speed of a object after a completing a circle of 5m radius in 5 seconds: (c) Zero (a)  $2\pi$ (d) 10m Average velocity is defined as (a) Displacement/time (b) Distance/time (c) Distance × time (d) Displacement x time A ball is fired horizontally from the top of a cliff with sped of 30ms-1. What will be its speed after four seconds. (b) 40ms (a) 30ms (c) 50ms Kinetic energy of a projectile is minimum at a point where velocity and acceleration are (a) Parallel (b) Anti-parallel (c) Perpendicular If a ball thrown with velocity v reaches to maximum height 'h'-then the ball having half mass and thrown with double velocity will reach maximum height (b) 2h If a car is moving with increasing velocity then the angle between its velocity and acceleration is: (b) 45° (c) 90° 9. If a lighter and heavier ball are moving with same momentum then (a) Lighter ball is moving faster (b) Heavier ball is moving faster (c) Both are moving with same speed (d) They can never have same momentum 10. A projectile is thrown at an angle  $\theta$ , during its motion the angle between velocity vector and acceleration: (a) Increase (b) Decrease (c) Remains same (d) Unpredictable 11. If a projectile is projected at an angle 60° then which of the following relation b/w range and height is true. (a) R > H (b) R < H (c) R = H (d)  $R = \sqrt{3}$ 12. At the highest point of trajectory of a projectile which of the following quantities is zero: (a) Horizontal velocity (b) Total velocity (c) Vertical velocity (d) None of these 13. If the velocity of an object is increasing with time then acceleration is (a) Negative (b) Positive (c) Zero (d) None of these 14. An object moves 20 m in 5 sec. What is the gradient of the displacement-time graph? (b) 15 (c) 4 (d) 1/4 15. An object is moving at constant speed, which of the following is always true: (a) Distance is greater than displacement (b) Distance is lesser than displacement (c) Distance is equal to displacement 16. The displacement has .... (d) We cannot answer (a) Magnitude only (b) Direction only (c) Magnitude and direction 17. If momentum of a freely falling body is changing at a constant rate 50 kgms⁻² then mass of the (a) 5kg (b) 25kg (c) 50kg (d) 500kg ADCAT PREP BOOF By AZHAR IQBAL 0336-7098894

FORCE AND MOTION

PRACTICE TEST NO. 2

ADCAT PRI-P BOOK

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28. In the above question acceleration produced in 1kg body is Zavan Publisher (c) 20ms⁻² (a) ones (d)  $0.5 \text{ms}^{-2}$ 29. A 250m long train is moving with a uniform speed of  $72kmh^{-1}$ . The time taken by the train to cross a bridge of length 750m is (b) 25 sec (c) 375 sec (d) 37.5 sec (a) 37.5 sec (d) 37.5 sec (a) 30. A 1 kg ball moving with speed 10m/s collides with a wall and rebounds with same speed. If time of impact is  $\frac{1}{10}$  sec then force exerted on the wall is: (d) 2000N 31. If a projectile reaches 100m height and 100m far from its initial point it strikes the ground then its angle of projection will be (d) 76° 32. At maximum height velocity of projectile is equal to (b) Horizontal component of velocity (c) Vertical component of velocity (d) Initial velocity 33. The expression for height of projectile is  $v_i^2 \sin^2 \theta$  $v_i^2 \sin^2 \theta$ 34. If force-time graph of a body is shown in the figure below then change in momentum of body will (b) 0.2N.s c 0.3N.s 35. A particle of mass m moving with a velocity strikes a wall and rebounds back. If the magnitude of the velocity is unchanged, the magnitude of force exerted on the wall by the particle during time of contact (t) will be: (a) Zero (b) 2mv/t (c) Mvt 36. The displacement-time graph of two bodies A and B are shown in fig. The ratio of  $V_A/V_B$  is: Displacement-time (a) √3 (b) 1/√3 37. For projectile motion in the absence of air resistance: (a) Vertical speed is constant (b) K.E is constant Horizontal acceleration is zero Vertical acceleration is zero AT PRI-P BOO By AZHAR IQBAL 0336-7098894

FORCE AND MOTION

38. Acceleration of particle is not zero if:

(a) Direction of velocity changes

(b) Magnitude of velocity changes

(d) All

(c) Speed changes
39. If v-t graph for three moving bodies A,B,C is shown in the figure below than distance covered in large for All have same

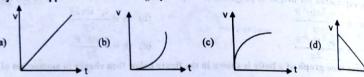
(a) A



40. The resultant of two displacement 10m and 4m may be

(b) 4m

41. An object is dropped from rest. Its v-t graph is



42. If two bodies of masses 1kg and 2kg are projected at angles of 30° and 60° respectively then the ratio between their maximum height will be:

(a) 1:1

(c) 3:1

43. When a 4kg bomb at rest explodes into two pieces of masses 1kg and 3kg moving in opposite direction. Then the ratio between linear momentum of the pieces is:

(b) 1:3

(c) 3:1

44. A force of 10N acts on stationary mass of 2kg for 5 s. then the gain in velocity is:

(a) 5 ms⁻¹

(b) 10 ms⁻¹

(c) 15 ms⁻¹

(d) 25 ms

45. Slope of velocity time graph gives the

(a) Displacement

(b) Speed

(c) Acceleration

(d) Velocity

46. If a body is falling freely then the distance covered by body in two second and 3rd second are (a) 20,30 (b) 20,25 (c) 20,45 (d) 25,45

47. For a moving body which of the following quantity can never by zero

(b) Displacement (c) Average velocity (d) Acceleration (a) Distance 48. If A is amplitude of pendulum then distance and displacement covered by simple pendulum in one vibration are:

(a) 0.0

(d) 0,4a (b) 4A,4A 49. The displacement time graph for two bodies A and B are straight lines inclined at 60° and 30° to (c) 4A,0 time axis. The ratio of their speeds is:

(a) 3:1

(b) 1:√3

(d) 1:3

50. A train has a speed of 60km/h for first one hour and 40km/h for the next half hour then its average speed is:

(a) 53km/h

(b) 80km/h

(c) 120km/h

(d) 180km/h

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Sr.	38.	39,	40.	41.	42.	43.	44.	45.	46.	47.	48. 49. 30. a a
Ans:	d	c	C	a	b	a	d	c	Ь	a	ca

MDCA LPREP BOOK

By AZHAR IQBAL 0336-709889

## PRACTICE TEST NO. 3

The ratio of displacement to distance covered by a body is always:

(a) Less than one

(b) Equal to one

(c) Greater than one

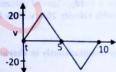
(d) Both a and b

2. The ratio of distance to magnitude of displacement for a semi-circle of radius r is: (b) π

(c)  $\pi/2$ 

3. If body covers first half displacement with velocity v₁ and second half displacement with velocity v2 then its average velocity is

Find the total distance and displacement covered from the following v-t graph:



(a) 0.0

100,100

(c) 200,200

(d) 100.0

5. Time rate of change of momentum of a body is equal to:

(a) Acceleration

(b) Force

(c) Torquel

(d) Power

6. Two blocks of masses 1kg and 3kg placed in contact are acted upon by a force of 40N. the acceleration of 1kg mass will be: (a) 4 ms⁻² (b) 10ms⁻²

(c) 30ms⁻²

(d) 50ms⁻²

7. A person standing in a boat throws a heavy stone in forward direction the boat moves in backward direction according to Newton's: (b) 2nd Law

(a) 1st Law

(c) 3rd Law

8. If the velocity time graph of a body is parallel to time axis then body is moving with (a) Uniform velocity

(b) Uniform acceleration

(c) Non uniform acceleration

(d) Both a and b

9. In case of elastic collision which of the quantity is conserved:

(c) Total energy (d) All of these

10. If 1kg body is projected at an angle 30° with the horizontal, with an initial velocity 20ms⁻¹. Then maximum height reached by the body is:

(a) 1m (b) 5m

(a) Kinetic energy (b) Momentum

(c) 10m (d) 0.5m 11. Trajectory of a projectile is shown in the figure below. Then what is its time of flight and horizontal range? (a) 4s, 120m (b) 8s,220m

12. An airplane flies 400m north, then 200m South then its resultant displacement is:

(b) 300m

(d) 16s,420m

13. If two bodies of masses 2kg and 4kg are subjected to same force then the ratio between the acceleration produced in the bodies is: (a) 1:2 (b) 2:1 (c) 1:4 (d) 1:1

14. If slope of velocity time graph is not constant at different points then body is moving with: (a) Constant acceleration (c) Variable acceleration Average acceleration (d) Uniform velocity 10. 11.

Secretarion will be:	FORCE AND MOTION	FORCE AND MOTION
secientation will be:  (a) 1 (b) √3 (c) √3 (d) Z _{GTO} 16. At which point the velocity and acceleration of projectile are perpendicular: (b) Nonaturan height (c) Point of projection (d) Point of projection (e) Point where his the ground (d) Point of projection (e) Point where his the ground (e) Point where his the ground (e) Point where his the ground (f) Some as (f) Point of projection (g) Law of electromagnetism (d) Law of inertia (e) Law of inertia (e) Law of electromagnetism (d) John (e) 40m (d) 50m (d) 80th have same acceleration (e) Both reaches the ground with same velocity (e) Polymore of the ground with same velocity (e) Both reaches the ground with same velocity (e) Polymore of the ground with velocity the ground of the ground	UNIT 01 Zayan Public a straight line inclined at 200	UNIT 01 Zayan Publisher
(a) Law of conservation of projectile is maximum height (b) Maximum height (c) Pound of projection (d) None  (a) Pound of projection (e) Maximum height (e) Maximum height (e) None  (a) Law of conservation of momentum (b) Law of universal gravity  (b) Law of electromagnetium (b) Law of universal gravity  (c) Law of electromagnetium (d) Law of universal gravity  (d) Law of conservation of momentum (e) Law of universal gravity  (e) Law of electromagnetium (d) Law of universal gravity  (f) Both caches the ground of the starting point value is trained  (f) Law of universal gravity  (g) Down (g) 45m (d) 50m  (g) Alm (d) 50m  (g) Both reaches the ground in same time  (d) All of these  (d) All of these  (d) All of these  (d) All of these  (e) Reaches the ground in same time  (d) All of these  (d) All of these  (e) Reaches the ground in same time  (d) All of these  (d) All of these  (e) Reaches the ground in same time  (d) Both and b (d) Law of gravitation  (e) Some stall point  (d) 50m  (e) Jim  (e) Maximum height  (g) Down deprojection is maximum at  (h) Law of universal gravity  (h) Some stall point  (g) Point of projection  (g) Down deprojection  (g) Down supple and leef falls from a tower simultaneously in absence of air friction then  (e) Both reaches the ground in same time  (g) All of these  (g) All of these  (h) All of these  (h) All of these  (h) All of these  (h) Some stall point  (h) Maximum height  (g) Down deprojection  (g) Down deprojection  (g) Down supple and leef falls from a tower simultaneously in absence of air friction then  (h) Some stall point  (g) Down deprojection  (g) Down same specification  (h) Maximum height  (g) Down deprojection  (g) Down deprojection  (g) Down same specification  (h) Maximum height  (g) Down deprojection  (g) Down deprojection  (g) Down same specification  (h) Maximum height  (g) Down deprojection  (g) Down same specification  (h) Maximum height  (g) Down deprojection  (g) Down deprojection  (g) Down same specification  (h) Maximum height  (g) Down deprojection  (g) Down	15. If displacement time graph of a body with time aris	Distance (b) B
(a) 16. At which point the velocity and acceleration of projectile are perpendicular representations.  (b) Maximum height (c) Point of projection (c) Maximum height in Ss then its time of fleging its:  (a) 25 (b) 105 (c) 155 (d) 255 (d) 2	( ) F	(a) D
(a) Point of projection (b) Maximum height (c) Point where it hit fine ground (d) None (e) Point where it hit fine ground (d) None (e) Point of projectile is maximum at (e) 15 (d) 25 (e) 15 (d) 25 (e) 15 (e) 25 (f) 25 (e) 25 (f) 25 (e) 25 (f) 25 (	√3 (d) Zero	A second of the
(a) Point of projection (b) Maximum height (c) Point where it hit fits ground (d) None (e) Point where it hit fits ground flow reaches its maximum height in 5s then its time of fight (e) Point of projection is also known as: (a) So (b) 10s (c) 15s (d) 25s (b) 10s (c) 15s (d) 25s (c) 15s (d) 25s (d) 25s (d) 25s (e) 15s (d) 25s (f) 25s (f) 10s (c) 15s (g) 25s (h) 10s (c) 15s (d) 25s (d) 25s (e) 15s (d) 25s (e) 25	16. At which point the velocity and acceleration of projectile are perpendicular:	
(a) None (b) 10s (c) 15s (d) 25s (d) 25s (d) 25s (e) 10s (e) 15s (d) 25s (e) 24s of electromagactism (e) Law of mentum (f) Law of universal gravity (g) Law of universal gravity (g) Law of electromagactism (g) Law of electromag	(a) Point of projection (b) Maximum height	Distance
17. If a 2kp body thrown with velocity 10m/s reaches its maximum height in Ss then its time of flight is:  (a) 25 (b) 10 (c) 15 (d) 25	(c) Point where it hit the ground (d) None	/ Wigner of a single of the si
(a) 25s (b) 10s (c) 13s (d) 25s (d) 25s (d) 25s (e) 18s (e) 18	17. If a 2kg body thrown with velocity 10m/s reaches its maximum height in 5s then its sin	
(a) 25s (b) 10s (c) 13s (d) 25s (d) 25s (d) 25s (e) 18s (e) 18	is:	
(a) Law of conservation of momentum (b) Law of inertia (c) Law of celetromagnetism (d) Law of universal gravity (e) Law of celetromagnetism (d) Law of universal gravity (e) Law of celetromagnetism (f) Law of universal gravity (g) Law of celetromagnetism (h) Law of universal gravity (e) Law of celetromagnetism (f) Law of universal gravity (g) Law of universal gra	(a) 5s (b) 10s (c) 15s (d) 25s	and a section of projectile is maximum at
(c) Law of electromagnetism (d) Law of universal gravity [9]. If a bomb is projected at an angle of 45° with velocity 20m/s. How far from the starting point high it strike?  (a) 20m (b) 30m (c) 40m (d) 50m  (b) 80m reaches the ground with same velocity  (c) Both reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (a) 81m reaches the ground in same time  (d) All of these  (a) 81m reaches the ground in same time  (a) 81m reaches the ground in same time  (a) 81m reaches the ground in same time  (b) 15m (b) 30m (c) 45m (d) 60m  (c) 45m (d) 60m  (d) 15m  (e) 15m  (e) 15m  (for the string which is striked in the starting point after the ground.  (e) 2sec (b) 4sec (c) 6 sec (d) 8sec  (a) 15m (b) 30m (c) 45m (d) 60m  (b) 15m  (c) 45m  (d) 60m  (e) 15m  (e) 15m  (for the striked in the starting point after the ground.  (e) 2sec (b) 4sec (c) 6 sec (d) 8sec  (for the string which is striked the ground.  (g) 2sec (b) 4sec (c) 6 sec (d) 8sec  (h) 15m  (h) 30m  (c) 45m  (d) 60m  (e) 15m  (for the string which is stored in ground with velocity 19.6ms² drop a stone at height of 156.8m What time taken by stone to reach the ground.  (for the string which is stored the ground.  (g) 2sec (b) 4sec (c) 6 sec (d) 8sec  (h) 4sec  (h)	18. Newton first law of motion is also known as:	
9. If a body is projected at an angle of 45° with velocity 20m/s. How far from the starting point we starting point as figure below then the height reached the starting point as figure below then the height reached to starting point we starting point as figure below then the height reached to starting point as figure below then the height reached to starting point as figure below then the height reached to starting point as figure below then the height reached to starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below then the height reached to some starting point as figure below the starting point as figure below then the height reached in the spirit starting point as figure below the starting point as figure below then the height reached the spirit starting point after bouncing of the wall several times, then:  (a) 1 starting point as the starting point after bouncing of the wall severa	(4) 1	(d) Same at all point
(a) 20m (b) 30m (c) 40m (d) 50m (e) 40m (d) 50m (e) 40m (d) 50m (e) 40m (e) 80m (e) 80	(c) Law of electromagnetism (d) Law of universal gravity	to variation in speed of a lift moving upward is shown in figure below then the beight reached
(a) 20m (b) 30m (c) 40m (d) 50m (e) 40m (d) 50m (e) 40m (d) 50m (e) 40m (d) 50m (e) 40m (e) 40	y. II a bomb is projected at an angle of 45 with velocity 20m/s. How far from the starting Doint with	by lift will be
(a) Both have same acceleration (b) Both reaches the ground with same velocity (c) Both reaches the ground with same velocity (d) All of these (e) R. A. 25kg stone is released from rest and falls towards earth, after 4s the magnitude of in momentum is: (a) 98kgms ⁻¹ (b) 78kgms ⁻¹ (c) 39kgms ⁻¹ (d) 50N (d) 50NN (e) 50N (e) 60° (d) 76° (e) 3° law of motion (e) 3° law of motion (f) 4 law of gravitation (herease the force on head (e) 1 if decrease the time of impact (e) 1 if decrease the time of impact (f) 1 increase the force on head (h) 1 inc	4) 40	(a) 15m (b) 30m (c) 45m (d) 60m
(a) Both have same acceleration (b) Both reaches the ground with same velocity (c) Both reaches the ground with same velocity (d) All of these  1. A. 2.5kg stone is released from rest and falls towards earth, after 4s the magnitude of its momentum is: (a) 9kkgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms¹ (d) 59kgms¹ (a) 9kkgms¹ (b) 500N (c) 50N (d) 500N (b) 50N (d) 500N (c) 50N (d) 500N (d) 500N (e) 50N (d) 500N (e) 50N (d) 500N (e) 50N (d) 500N (e) 50N (d) 500N (f) 50N (d) 50N (g) 50N (	0. When an apple and leaf fulls from a tower simultaneously in absence of 1.	(a) Svill made
(b) Both reaches the ground in same velocity (c) Both reaches the ground in same time (d) All of these (d) All of these (e) Both reaches the ground in same time (e) Both reaches the ground in same time (e) A 2.5kg stone is released from rest and falls towards earth, after 4s the magnitude of its momentum is: (a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms² (d) 59kgms² (e) 50N (d) 500N (e) 50N (e) 50N (d) 500N (f) 500N (g) 50N (h) 500N (g) 50N (h) 500N (g) 50N (h) 500N (h) 50DN (h) 45° (c) 60° (d) 76° (h) 65° (c) 60° (d) 76° (h) 65° (c) 60° (d) 76° (h) 60° (d) 17° (h) 60° (h) 45° (h) 60° (d) 180° (h) 70° (h) 60° (h)	(a) Both have same acceleration	3 +
(c) Both reaches the ground in same time (d) All of these (d) All of these (d) All of these (e) All of these (fine momentum is: (a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms² (a) 59kgms² (b) 78kgms¹ (c) 39kgms² (d) 59kgms² (a) 50N (b) 500N (c) 50N (d) 5000N (a) SI unit of momentum is (a) N.S (b) Kgms² (c) Both a and b (d) Js (a) S.S (b) Kgms² (c) Both a and b (d) Js (b) Foresure (d) Impulse (e) Pressure (a) Increase the fire of impact (c) It decrease the time of impact (c) It decrease		v(m/s)2 2 +
(d) All of these momentum is: (a) 98kgms¹ (b) 78kgms¹ (c) 39kgms² (d) 59kgms² (d) 59kgms² (e) 50N (d) 500N (f) 500N (g) 50N (		
1. A. 2.5kg stone is released from rest and falls towards earth, after 4s the magnitude of in momentum is:  (a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms⁴ (a) 59kgms² (b) 78kgms² (c) 50N (d) 500N (b) 50N (c) 50N (d) 500N (c) 50N (d) 500N (d) 5. SI unit of momentum is (a) N. S. (b) Kgms¹ (c) Both a and b (d) J. S. 1. Standard momentum of a body is equal to (a) 30° (b) 45° (c) 60° (d) 76° 5. The change in momentum of a body is equal to (a) Force (c) Pressure (d) Impulse (b) It increase the time of impact (c) It decrease the time of impact (c) It decrease the time of impact (d) Both a and b (b) It increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b (b) It increase the force on head (b) It increase the ime of impact (d) Both a and b (d) Both a and b (e) It decrease the time of impact (d) Both a and b (a) 30° (b) 45° (c) 90° (d) 180° 8. If a ball is projected with velocity u then its maximum range will be (a) 30° (b) 43° (c) 90° (d) 180° 9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is (a) 22 (d) 2/g (d) 2	The state of the s	4 1 1
(a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms¹ (a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms¹ (a) 5N (b) 50N (c) 50N (d) 500N (b) 500N (c) 50N (d) 500N (c) 50N (d) 500N (d) 500N (e) 50N (d) 500N (f) 50N (d) 500N (h) 50N	A 2.5kg stone is released from rest and falls towards earth after 40 stone	5 10 15 20 t (Sec)
(a) 98kgms¹ (b) 78kgms¹ (c) 39kgms¹ (d) 59kgms¹ (d) 59kgms¹ (d) 59kgms¹ (d) 59kgms¹ (a) 57k (d) 59kgms¹ (a) 57k (d) 59kgms¹ (a) 57k (d) 59kgms¹ (b) 59kgms¹ (c) 59km (d) 59000 (c) 59km (d) 59000 (d) 59000 (d) 59kgms¹ (e) Both a and b (d) J.s (a) N.S (b) Kgms¹ (c) Both a and b (d) J.s (a) 30° (b) 45° (c) 60° (d) 76° (d) 76° (e) Force (e) Pressure (e) Impulse (e) It increase the time of impact (e) It decrease the time of impact (f) Both a and b (h) Los (a) 30° (b) -30° (c) 90° (d) 180° (d) 180° (e) 30° (b) -30° (c) 90° (d) 180° (e) 30° (e) 90° (e) 90° (d) 180° (e) 30° (e) 90° (	momentum is:	At A believes assending upward with release, 10 ( )
The average force necessary to stop a body, having a momentum of 25N s, in 0.05s is:  (a) 5N (b) 500N (c) 50N (d) 500N  (a) N.S (b) Kgms¹ (c) Both a and b (d) J.s.  Range of projectile is maximum at  (a) 30° (b) 45° (c) 60° (d) 76°  The change in momentum of a body is equal to  (a) Forc  (b) Power  (c) Pressure (d) Impulse  Wearing a helmet prevents from injury because  (a) Increase the force on head (b) It increase the time of impact  (c) It decrease the time of impact (d) Both a and b  (a) 30° (b) -30° (c) 90° (d) 180°  A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be  (a) 30° (b) -30° (c) 90° (d) 180°  (b) If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is  (a) 2u (b) u² (c) u² (d) 2g  g  P. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is  (a) 2u (b) 4z² (c) 10x² kgms² (d) Zero  10x 10° kg	200 A COLUMN AND A	34. A nencopier ascending upward with velocity 19.6ms drop a stone at height of 156.8m What is
(a) 5N (b) 500N (c) 50N (d) 500N (d) 500N (e) 50N (d) 500N (f) 500N (g) 50N (d) 500N (h) 50N (d) 50N		(a) 2 sec (b) 4 sec
SI unit of momentum is  (a) N.S  (b) Kgms¹  (c) Both a and b  (d) J.s  Range of projectile is maximum at  (a) 30°  (b) 45°  (c) 60°  (d) 76°  The change in momentum of a body is equal to (a) Force (c) Pressure  (d) Impulse  (e) It increase the time of impact (d) Both a and b  (e) It increase the time of impact (e) It decrease the time of impact (f) It decrease the time of impact (g) It decrease the time of impact (g) It decrease the ime of impact (g) It decreases the ime of impact (g) It a squash, ball comes back to its starting point after bouncing off the wall several times, then: (a) Its total displacement is non-zero but its average velocity is non-zero (b) Its total displacement is zero and so also is its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity is non-zero (d) Its	(-) (2)	
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(a) 30° (b) 45° (c) 60° (d) 76°  The change in momentum of a body is equal to (a) Force (b) Power (c) Pressure (d) Impulse  Wearing a helmet prevents from injury because (a) Increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b  A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be (a) 30° (b) -30° (c) 90° (d) 180°  If a ball is projected with velocity u then its maximum range will be (a) 2g / 2g		36. Displacement is a
The change in momentum of a body is equal to  (a) Force (b) Power (c) Pressure (d) Impulse  Wearing a helmet prevents from injury because (a) Increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b  A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be  (a) 30° (b) -30° (c) 90° (d) 180° (a) If a ball is projected with velocity u then its maximum range will be (a) 2u (b) u² (c) u² (d) u² (d) u² (d) u² (d) u² (e) U² (f) u² (g) u² (		(a) Tensor (b) Vector (c) Scales (d) N
(a) Force (b) Power (c) Pressure (d) Impulse  (a) Increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b  (e) It decrease the time of impact (d) Both a and b  (e) It decrease the time of impact (f) It decrease the time of impact (g) Inertia of turning (g) Inertia of turning (g) It decrease the time of impact (g) Inertia of turning (g) It decrease the time of impact (g) Inertia of turning (g) Inertia of turning (g) It decrease the time of impact (g) Inertia of turning (g) Inertia of tu		37. Which of the following motion is a type of 2D motion?
(c) Pressure  (d) Impulse  Wearing a helmet prevents from injury because  (a) Increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b  A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be  (a) 30° (b) -30° (c) 90° (d) 180°  B. If a ball is projected with velocity u then its maximum range will be (a) \frac{2u}{g} (b) \frac{u^2}{2g} (c) \frac{u^2}{2g} (d) \frac{u}{2g} (d) \frac{u}{2g} (e) If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is height will be (a) \frac{1}{12}(2) \frac{1}{12}(2) \frac{1}{12}(3) \frac{3}{12}(3)		(a) Circ I Pendulum
(a) Increase the force on head (b) It increase the time of impact (c) It decrease the time of impact (d) Both a and b (e) It decrease the time of impact (d) Both a and b (e) It decrease the time of impact (d) Both a and b (e) It decrease the time of impact (d) Both a and b (e) It decrease the time of impact (d) Both a and b (e) It decrease the time of impact (d) Inertia of motion (e) Inertia of motion (f) Inertia of acceleration (d) Inertia of acceleration (e) Inertia of motion (f) Inertia of acceleration (g) Inertia of motion (g) Inertia of motion (h) Inertia of acceleration (h) Inertia of acceleration (h) Inertia of acceleration (g) Inertia of motion (g) Inertia of motion (h) Inertia of acceleration (h) Inertia of acce	(c) Pressure (d) Impulse	(c) Projectile motion (d) All of these
(c) It decrease the time of impact (d) Both a and b  7. A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be (a) 30° (b) -30° (c) 90° (d) 180°  8. If a ball is projected with velocity u then its maximum range will be (a) \frac{2u}{g} (b) \frac{u^2}{2g} (c) \frac{u^2}{u^2} (d) \frac{u}{2g}  9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is (a) 2x10°3 kgms¹ (b) 4x10°3 kgms¹ (c) 10x10°3 kgms¹ (d) Zero  0. Two balls are projected at angles 30° and 45° with same initial speed. The ratio of their maximum height will be (a) 1:\(\frac{\sqrt{2}}{2}\) (b) \(\sqrt{\sqrt{2}}\); 1 (c) 1:2 (d) 2:1  (d) 2:1  (e) Inertia of turning (b) Inertia of acceleration (d) Inertia of acceleration (string) (in the control of the wall several times, then:  (a) Is stotal displacement is zero but its average velocity is non-zero (d) Its total displacement and its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity when launched at 90 degree with respect to horizontal then its trajectory is (e) Projectile when launched at 90 degree with respect to horizontal then its trajectory is (e) Periodic (f) Linear (h) Linear (h	. Wearing a helmet prevents from injury because	38. People sitting in a moving bus experience a jork when the
(c) It decrease the time of impact  (d) Both a and b  (A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at same level will be  (a) 30°  (b) -30°  (c) 90°  (d) 180°  (d) 180°  (e) Inertia of turning (d) Inertia of acceleration  If a squash, ball comes back to its starting point after bouncing off the wall several times, then:  (a) 1s total displacement is zero but its average velocity is non-zero  (b) Its total displacement is non-zero but its average velocity is non-zero  (c) Both its total displacement is zero and so also is its average velocity  (d) Its total displacement is zero and so also is its average velocity  (e) Both its total displacement is zero and so also is its average velocity  (g) Its a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is  (a) 2x10 ⁻³ kgms ⁻¹ (b) 4x10 ⁻³ kgms ⁻¹ (c) 10x10 ⁻³ kgms ⁻¹ (d) Zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity is non-zero  (e) Both its total displacement is zero and so also is its average velocity is non-zero  (d) Its total displacement is zero and so also is its average velocity  (e) Projectile	(a) Increase the force on head (b) It increase the time of impact	
A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground it same level will be  (a) 30° (b) -30° (c) 90° (d) 180° (e) 90° (e) 90° (f) 180° (f) 180° (g) 180° (g) 180° (g) 180° (h) 180°	(c) It decrease the time of impact (d) Roth a and h	(c) Inertia of turning
(a) $30^{\circ}$ (b) $-30^{\circ}$ (c) $90^{\circ}$ (d) $180^{\circ}$ 8. If a ball is projected with velocity u then its maximum range will be  (a) $\frac{2u}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{g}$ (d) $\frac{u}{2g}$ 9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is (a) $2x10^{\circ3}$ kgms ⁻¹ (b) $4x10^{\circ3}$ kgms ⁻¹ (c) $10x10^{\circ3}$ kgms ⁻¹ (d) $2ero$ 0. Two balls are projected at angles $30^{\circ}$ and $45^{\circ}$ with same initial speed. The ratio of their maximum height will be  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ (d) $180^{\circ}$ (d) $180^{\circ}$ (e) Both its total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also is its average velocity is non-zero lts total displacement is zero and so also	. A body is projected at on angle 30° with x-axis then the angle with which it strikes the ground at	a squash, Dall comes back to its starting point often bouncing off the said
(a) $\frac{30}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{2g}$ (d) $\frac{u}{2g}$ 9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is (a) $2x10^{-3}$ kgms ⁻¹ (b) $4x10^{-3}$ kgms ⁻¹ (c) $10x10^{-3}$ kgms ⁻¹ (d) $2ero$ (e) Both its total displacement and its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity when launched at 90 degree with respect to horizontal then its trajectory is (e) Parabolic (f) Hyperbolic trajectory (f) Hyperbolic trajectory (g) Hyperbolic trajectory (g) Its total displacement and its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity is non-zero (d) Its total displacement is zero and so also is its average velocity (e) Periodic (f) Its total displacement is zero and so also is its average velocity (d) Its total displacement and its average velocity is non-zero (d) Its total displacement and its average velocity is non-zero (d) Its total displacement and its average velocity is non-zero (d) Its total displacement and its average velocity is non-zero (d) Its total displacement and its average velocity is non-zero (e) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement and its average velocity (e) Its total displacement and its average velocity (d) Its total displacement and its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its total displacement is zero and so also is its average velocity (d) Its average velocity (d) Its average velocity (d) Its average ve	same level will be	(b) Its total displacement is zero but its average velocity is non-zero
1. It a ball is projected with velocity u then its maximum range will be  (a) $\frac{2u}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{g}$ (d) $\frac{u}{2g}$ 9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is  (a) $2x10^3$ kgms ⁻¹ (b) $4x10^3$ kgms ⁻¹ (c) $10x10^3$ kgms ⁻¹ (d) Zero  1. Two balls are projected at angles 30° and 45° with same initial speed. The ratio of their maximum height will be  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ (e) $2:2$ (f) $2:1$	(a) 30° (b) -30° (c) 90° (d) 180°	
(a) $\frac{2u}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{g}$ (d) $\frac{2g}{2g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{2g}$ (g) $\frac{u^2}{g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (e) $\frac{u^2}{g}$ (f) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (h) $\frac{u^2}{g}$ (g) $\frac{u^2}{g}$ (h) Projectile when launched at 90 degree with respect to horizontal then its trajectory is (e) Periodic (f) Hyperbolic trajectory (f) Linear (h) Hyperbolic trajectory (h) Hyperbolic trajectory (h) Linear (h) Linear (h) Hyperbolic trajectory (h) Linear (h) Linear (h) Hyperbolic trajectory (h) Linear (h) H	3. If a ball is projected with velocity u then its maximum range will be	(d) Its total displacement and its average velocity is non-zero
9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is  (a) $2x10^{-3} \text{ kgms}^{-1}$ (b) $4x10^{-3} \text{ kgms}^{-1}$ (c) $10x10^{-3} \text{ kgms}^{-1}$ (d) Zero  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ (a) Parabolic (c) Parabolic (c) Parabolic (d) Hyperbolic trajectory (d) Linear  (b) Hyperbolic trajectory (d) Linear  (c) $10x10^{-3} \text{ kgms}^{-1}$ (d) $2:1$ (d) $2:1$ (e) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ (a) Parabolic (e) Parabolic (f) Hyperbolic trajectory (hyperbolic traject		40. Projectile when lowest are sero and so also is its average velocity
(a) $2x10^{-3}$ kgms ⁻¹ (b) $4x10^{-3}$ kgms ⁻¹ (c) $10x10^{-3}$ kgms ⁻¹ (d) Zero  O. Two balls are projected at angles 30° and 45° with same initial speed. The ratio of their maximum height will be  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ (e) $1:2$ (d) $2:1$ (e) $1:2$ (e) $1:2$ (f) $1:2$ (f) $1:2$ (f) $1:2$ (g) $1:2$ (h) $1$	g 2a a	(a) Parabolic
(a) $2 \times 10^{-5} \text{ kgms}^{-1}$ (b) $4 \times 10^{-3} \text{ kgms}^{-1}$ (c) $10 \times 10^{-3} \text{ kgms}^{-1}$ (d) Zero  0. Two balls are projected at angles 30° and 45° with same initial speed. The ratio of their maximum height will be  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ Sr. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.	9. If a 100 dynes force acts on a 5kg body for two seconds then impulse on the body is	(c) Periodic
0. Two balls are projected at angles 30° and 45° with same initial speed. The ratio of their maximizes height will be  (a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ Ans: b d 33. 34. 35. 36. 37. 38. 39. 40.		(d) Linear
(a) $1:\sqrt{2}$ (b) $\sqrt{2}:1$ (c) $1:2$ (d) $2:1$ Ans: b d 33. 34. 35. 36. 37. 38. 39. 40.	0. Two balls are projected at angles 30° and 45° with come initial speed. The ratio of their manner	the religion of the religion of the second of the flag of the second of
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MIDCAT PREP BOOK 236 By AZHAR IQBAL 0336-7098894	MAIDCA   PRI P ROOK 0336-7098899	237 By AZHAR IQBAL 0336-7098894
236 By AZHAR IQBAL	236 By AZHAR IQBAL	

16.	If two bodies are projected with same sp	eed at	angle o	of 30°	and 60°	then the ratio	between their
	time of flight will be:				e of near		restrict the trick

(b) 1:√3

 $\sqrt{3}:1$ (c)

17. If velocity of projectile at maximum height is 50% of its initial velocity then the angle of projection is: (b) 45° (c) 60°

(a) 30°

18. When we jump out of a boat standing in water, it moves:

(a) Backward

(b) Sideways

(c) Forward

(d) None of these

19. A moving body will have impulse if it is moving with

(a) Variable velocity

(b) Constant acceleration

(c) Variable acceleration

(d) All of these

20. If two bodies of unequal masses collide with each her then which of the following statement is not

(a) Both are subjected to same force

(b) Both are subjected to same impulse

(c) Momentum of both balls changes equally

(d) None of these

21. A 1200kg car has its velocity reduced from 20ms⁻¹-1 to 15ms⁻¹ in 3 se(c) the retarding force on the car is

(b) 200N

(c) 2000N

(d) 20000N

22. The time rate of change of momentum of a body falling freely under the action of gravity is equal to its.

(a) Kinetic energy

(b) Impulse

(c) Weight

(d) Acceleration

23. The velocity of a car which is decelerating uniformly changes from 30ms⁻¹ to 15ms⁻¹ in 75m. After what further distance will it come to rest?

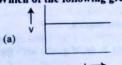
(c) 75m

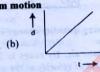
(b) 50m 24. If 10N fore causes a change in momentum of the body 0.5kgms-1 then time of impact of force is

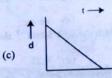
(a) 5 sec

20 sec

25. Which of the following graph represents the uniform motion







All of these

26. A bomb of mass 200g is thrown in vertically upward direction and it' explodes at the top of its path into two pieces. If one piece of mass 50g moves with velocity 15m/s then velocity of 2nd piece will be

b

Ans:

(c) 30ms⁻¹

(d) 45ms⁻¹

27. A ball is projected at 45°. If its horizontal range is 40m then its velocity of projection will be (c) 20ms⁻¹ (b) 10ms (a) 5ms⁻¹ 26. 25. 22. 23. 21. 20. 19. 16. d d d

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28. Force required to accelerate a 2kg body from velocity 5ms⁻¹ to 10ms⁻¹ in 20 sec is (a) 0.1 N

**FORCE AND MOTION** 

(d) 1.5N

(a) 0.115N

(b) 1.5N

(c) 1.5N

(d) 1.5N

(e) 1.5N

(e) 1.5N

(e) 1.5N

(force required to stop another car in same time, moving with double momentum will be: (b) 2F (c) F/2

(a) (d) 4F

30. If X is distance covered by a freely falling body in two seconds and Y is distance covered in 3rd second then the relation between X and Y will be (a)  $\chi = 5Y$  (b)  $\chi = \frac{\gamma}{2}$ 

(c) X = Y - 5

(d) X = Y + 5

31. Force required to accelerate an object of mass 2kg from rest to a velocity 10ms in 5 sec is (b) 4N (c) 8N

32. Mass M₁ has a velocity of 0 m/s and mass M₂ has a velocity of 5 m/s. Mass M₁ > M₂. Which one

has larger inertia?

(b) M₁

(c) Both M1 and M2 (d) Not enough information 33. Two blocks of masses 1kg and 4kg are placed in centact and are acted upon by a force of 50N then the force on 4kg body is

(a) 10N

(b) 40 N

(c) 50N

(d) 200 N

34. Rate of change in displacement is known as:

(b) Velocity

(c) Acceleration

(d) Momentum

(a) Speed 35. If a projectile is launched with 3m/s velocity at 60 degree angle then at highest point its horizontal velocity is

(a) 3 m/s

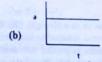
(b) 2 m/s

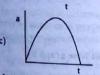
(c) 1.5 m/s

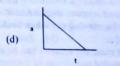
(d) 1.8 m/s

36. If A body falls under the action of gravity then the graph between its acceleration and time will









37. Velocity of an object changes from 20 m/s to 50 m/s in 5 sec. What is the acceleration of the

(a) 6 m/s

(b)  $6 \text{ m/s}^2$ 

38. If a heavy ball of 5kg moving with velocity 10ms⁻¹ collides with a stationary ball of mass 10g. Considering elastic collision the velocity of lighter ball after the collision will be (a) Zero

39. Two balls of masses m₁ and m₂ moving in same straight line undergo an elastic collision then transfer of energy will be minimum

(a)  $m_1 = m_2$ 40. If three balls of masses 1kg, 2kg and 3kg are moving with velocities  $20 \text{ms}^{-1}$ ,  $15 \text{ms}^{-1}$  and  $5 \text{ms}^{-1}$ 

respectively then it will be more harder to stop (a) | kg ball (b) 2kg ball (d) None of thes (c) 3kg ball 29. 31. 32. 38. 39. 35. 36. 37.

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41. If a shell explodes in air and its fragments	fly off in different directions.	Then total momentum
fragments is		mentum 0

(a) Zero

(b) Less than initial momentum

(c) Greater than initial momentum

(d) Equal to initial momentum

42. If a 2kg ball moving with velocity 2ms⁻¹ strikes the wall and rebounds back with same velocity then impulse acting on the ball will be

(a) Zero

(b) 2 N.s

(c) 4 N.s

(d) 8 Ns

43. If a ball projected vertically upward reaches the ground in 10 sec with velocity 49ms⁻¹ then acceleration of the ball is.

(a) 4.9ms⁻²

(b) 9.8ms⁻²

(c) -4.9ms⁻²

(d) -9.8ms⁻²

44. Consider a car is travelling for one hour. In which of the following cases the average velocity is zero?

Car travels 20 km due east

Car travels 60 km due east, then turns around and travels 40 km due west

(c) Car travels 70 km due east

(d) Car travels 30 km due west, then turns around and travels 30 km due east

45. Decrease in velocity per unit time is called

(a) Acceleration

(b) Retardation

(c) Positivity acceleration

(d) Uniform acceleration

46. A body falls freely under the action of gravity. How much distance it falls during an interval between 2nd and 3rd second of its motion.

(a) 5m

(b) 10m

(c) 25m

(d) 45m

47. When a particle is launched at angle of 90 degree with respect to horizontal then vertical acceleration is

(a)  $-9.8 \text{ m/s}^2$ 

(b)  $9.8 \text{ m/s}^2$ 

(c) 0

(d)  $5 \text{ m/s}^2$ 

48. When an object moves in a straight line then

(a) Its displacement is equal to distance

(b) Its displacement is greater than distance

(c) Its displacement is less than distance

(d) We cannot measure displacement

49. Acceleration of a moving car when brakes are applied is

(a) Negative

(b) Zero

(c) Positive

(d) Infinite

50. A motion with constant velocity can be represented on displacement time graph by:

(a) A horizontal line

(b) A curve line with decreasing gradient

(c) A straight line with constant gradient

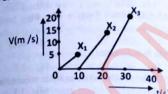
(d) A curve line with increasing gradient

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## PRACTICE TEST NO. 5

FORCE AND MOTION

The X1, X2 and X3 are distance travelled by the three different particles whose velocity-time graph are shown below then



(a)  $x_1 > x_2 > x_3$ 

(b)  $x_1 = x_2 > x_3$ 

(c)  $x_1 = x_2 = x_3$ 

(d)  $x_1 < x_2 < x_3$ 

2. An athlete completes one round of a circular track of radius 10m in 40 seconds what will be its average velocity

(a) 0.5 ms⁻¹

(b)  $\pi/4 \text{ ms}^{-1}$ 

(c)  $\pi/2ms^{-1}$ 

3. If a body is thrown vertically upward, it moves upward with acceleration 'x' and moves downward with acceleration 'y' then the angle between 'x' and 'y' is: (a) 0° (b) 45°

4. How far does a car travel in 6 s if its initial velocity is 2 m/s and its acceleration is 2 m/s2 in the (a) 12 m (b) 14 m

(c) 24 m

(d) 48 m

5. The ratio of unit of impulse to unit of momentum is: (a) kg (b) m

(c) s-1

6. In case of projectile motion which of the following quantity is conserved (remain constant): (b) Velocity 7. When body is projected at an angle of 30° then which of the following always remains zero; (c) Acceleration

(d) Kinetic energy

(a) Vertical velocity (c) Vertical acceleration

(b) Horizontal velocity

8. A body of mass m is projected at an angle heta with initial velocity v then maximum height reached (d) Horizontal acceleration

(a) Mass

(b) Angle of projection (c) Initial velocity 9. If body is projected with initial velocity  $10ms^{-1}$  it reaches to maximum height of 40m. What will be maximum height if body is projected with initial velocity of 20ms⁻¹ at the same angle of

(a) 20m

(d) 160m

10. At which angle of projection the horizontal range will be maximum

11. If the ratio between time of flight of two projectiles is 1:2 then the ratio between their maximum (a) 1:2 (b) 2:1 12. Quantitative measure of inertia of the body is its:

(b) Volume

(c) 1:4

(c) Energy (d) Momentum

UNIT 01	FORC	EAN	D MOT	TION	Gran	土地	1		Z	ayan I	ublish	OI:
13. A force of 2N acts on a	2kg body	for 5s	then th	ne cha	nge in	mome	ntum	of the	body i	is:		_
(a) 5kgm/s	(b) 2	2kgm/s			(c)	l0kgm/	S	(	d) Z	ero		
4. An engine of the car p	roduces th	e accel	leratio	n of 4	m/s	in the	e car.	If this	car p	ills an	other c	ar
of same mass then acco						2		BUT.				
$(a) 8m/s^2$	(b)	4m/s ²				$2m/s^2$				/2ms ⁻²		
5. A body is thrown in		direct	tion w	ith ve	locity	20m/s	from	a 20n	high	towe	r then	it
horizontal range will b												
(a) 10m	(b)				(c)			- 10.5	(d) 5	0m		
6. At which of the follow			ig of pi	rojecti	le is r	naximu	m:					
(a) 20°	(b)	40°			(c)	60°			(d) 8			
7. If the ratio between ti	me of fligh	t of tw	o bodi	ies is 1	:3 the	en ratio	betwe	en the	ir ma	ximum	heigh	t:
(a) 1:9	(b)	9:1			(c)	1:3			(d) :	3:1		
18. A force $\vec{F} = 8i - 6j -$	10k N pr	oduce	s an ac	ccelera	tion	of 1 ms	in a	body.	The r	mass o	f the b	od
in.												
(a) 10 kg	(b)	14ke			(c)	20kg			(d)	200kg		
19. A graph is drawn w	ith force	along	Y-axis	and	time	along 2	K-axis.	The	area I	under	the gr	ap
represents:	nu lorce										60	•
					(b)	Mome	entum	of forc	e			
(a) Momentum					(4)	Impul	se of f	orce				
(c) Work 20. A ball is thrown vert	ically unu	ard w	ith a v	elocit	v of 9	8 ms-1.	If it ta	kes 1	s to	reach	the hig	he
point, then the accele	ration of t	he hal	18:									
							-2		(d)	-9.8 n	1s ⁻²	
(a) 9.8 ms ⁻² 21. A projectile is throw	(0)	nale A	duri	na its	motio	on the	angle	betwee	en ve	locity	vector	al
	n at an a	ngie o	, duit	ng ns								
acceleration:					(c)	Rema	ains sa	me	(d)	Unpre	edictab	e
(a) Increase	(b)	Decr	ease			valocit	v 30n	ns-1	The ti	me fo	r which	1
(a) Increase 22. A force of 6N acts of	n a mass	of 1kg	which	n acqu	iire a	Veloci	, , ,	1				
force acts is:	(b)	-			(0)	60			(d)	2s		
(a) 8s	(b)	5s		al Gain	20-							
(a) 8s 23. Momentum of a 1000	okg car if i	it cove	rs a di	stance	(c)	2000	Ns		(d)	20,00	00Ns	
(a) 20Ns	(b)	2001	Ns		(0)	alogitie	e 15m/	s and	5m/s	respec	tively.	T
(a) 20Ns 24. 1f a 1000kg car and	2500kg ti	ruck a	re mo	ving w	itin v	elocitic	dara	अंग्राम्य	(brail B		वृत्तीत हो।	
force needed to stop	them in sa	anne is		413	Ca	An other						
					Ca	n not be	deteri	mined			thed H	
(c) Same for	r car and t	ruck	Mar.	(d)	th ca	ma mai	mentu	m the	n which	ch of t	he follo	)W
(a) Truck (c) Same for	equal mas	ses are	e movi	ing wi	tn sa	me mo	III CIII C				Pafour	
relation is correct.										mus.	(8)	m
relation is correct.  (a) $m_1v_1 = m_2v_2$						Division in			(d)	man of	- =	m
( ) = m ₂ V ₂ = m ₂ V ₂	(b)	m ₁ v	$m_2 = m_2$	VI	(c	) V ₁	V2			TOP	2	•••
(a) $m_1v_1 - m_2v_2$		DAPA									2011	
26. Impulse can be calc	alated fro	m area	unde	r		) Fore	201 10	-locar	nent o	raph		
26. Impulse can be calc	time at	ranh			(b	) For	e - dis	placei	ime or	aph		
					(d	Disp	placem	ent-t	mie B	arite.		
(c) Force	time grap	ody th	en			And In			· (d)	J=	ma	
27 If 'J' is impulse act	ing on a be	ouy th	m(ve-	- va)	(0	;) J=	f/t		(a)			
(a) $J = v_f - v_i$	(b	) ]-	men					1			The Real	
								The second	24	25.	26.	
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28. If A	y 4ms ⁻¹ is	opposi	ite dir	ection	n. The	final	veloci	ties of	hoth	obia	n a ZK	g ma	iss tra	velling w
velocit	-1 6ms							(b)	ms ,	objec	tafter	the	collisi	On are
(a) (	oms , oms	1												ou are
(c) 2	oms , 6ms			4 .62	0m -	1		(a) 8	Sms ⁻¹ ,	6ms ⁻¹				
ha	II IS the one	n with a	speed	012	oms	at a	n, ang	le of ;	30° th	en its	time o	e a:		
29. [[ 8 0]	1 sec		(b)	1.2	sec		(6	) 2	sec			(1)	nt wil	l be abou
(a)	mum rang	of pro	jectile	is 16	0m the	en its	maxin	num l	height	will b		(a)	2.2 s	ec
30. If max	1 sec imum rang 20m		(b)	40r	n		(0	) 60	Om .	will t	е			
(a)	ett - falle	wing s	tatem	ent is	not tr	ne abo	ut ne	oi and!				(d)	80m	
11. Which	of the follo	velocity	is con	stant		ac mor	out pr	ojecti	le mo	tion p	roject	ed a	t an a	nole 'A'
(a) F	Acceleration	- in alay	ave no	roand	ioular		. (	0) \	ertica	l acce	leratio	n is	consta	nt
(c) A	Acceleration	n is aiw	ays pe	pend	icular	o veid	city						- onion	
	F at maxi	mum ne	right h	3 HOL Z	CIO									
- 16 a hod	ly is project	cted at a	an ang	gle of	60°. T	hen its	P.E	at hig	hest n	oint o	f it			
32. 11 a box	25%	Section 1/12	(b)	50%	6		(c	75	%	omit 0	1 113 (	rajec	tory	will be
and the same of	- f fallowin	g is not	true i	in cas	e of in	elastic	collie	ion	70			(d)	100%	6
33. Which	otal mome	entum i	s cons	erved	1111		/ Comp	5) T						
(a) I	otal K.E is	conser	ved		TOP'			b) T	otal e	nergy	is con	nserv	ed	
(c) T	Olai K.E I	roinater	lat c	nalos	200	1 (00	(							
34. If two b	alls are p	rojected	at ai	ngies	30 an	a 60°	with .	same	speed	then	the r	atio	b/w t	heir tim
Illaur M	III De													nen time
(a)	1:1			1:√3			(c)	√3	-1			(4)	1.2	
as A force	of 100N a	cts on a	5kg l	body	for 0.2	5 sec	than			94361	110	(d)	1:3	
35. A luice	of 100N actum of the	hody w	ill he	,	.0. 0.2	3 sec	then i	ate o	I chai	nge of	mom	entu	m an	d change
Moment	100, 25	, w	(b)		100									100
(a)	100, 23	6-11	(0)	100,	100		(c)	20	0, 25		(	d)	200	100
36. A body	of mass 21	cg lans	irom	a her	ght 12	5m ui	nder a	ction	of gr	avity.	The	time	taker	hy hall
	9	s:											·······	by ball
	2.5 sec		(b)	5 sec										
			1				(c)	7.5	sec		1	4)	10	
37. A body a	accelerates	unifor	mly w	hen n	et for	e acti	ng on	7.5	sec		(	d)	10 sec	
(a) Inc	accelerates crease unife	ormly	mly w	hen n	et for		ng on	it		Zaro				
(a) Inc 38. A fighter	crease unifor	horizo	mly w	hen n (b)	Decrea	ase un	ng on	it	(c)		(d)	c		
(a) Inc 38. A fighter	crease unifor	horizo	mly w	hen n (b)	Decrea	ase un	ng on	it	(c)		(d)	c		
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(a) Ind 38. A fighter is 800m : (a)	crease unifor r jet flying ahead of it 20ms ⁻¹	horizon	ntally ler to	(b) at a l hit the	Decrea Decrea neight e targe	of 2kr	iformi in about shou	it y ve the	(c) grou	nd re	(d) leases of jet.	C a bo	onstar	nt but not
(a) Ind 38. A fighter is 800m : (a)	r jet flying ahead of it 20ms ⁻¹	horizon	ntally ler to (b)	(b) at a l hit the	Decrea neight e targe	of 2kr	iformi n abo t show	y ve the old be	(c) grou	nd re	(d) leases of jet.	C a bo	onstar	nt but not
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(a) Introduced in the second i	rease unifor jet flying ahead of it 20ms in ary nucle moves with (A - 1) If the follow objectile mot object three cetile has not objectile as a whose an it was a constant.	horizon In ord us of respeed us in speed us in speed us in horizon us in horizon us in horizon us re projegle is	mly w ntally ler to l (b) nass i u in o (b) motion motion m ran (b) ected	then n (b) at a l hit the 40ms no. 'A pposi on with ge 12 60m with s	net force Decrease in the property of the pro	ase un of 2kr et wha ays by ction stant a	mg on iforming about show (c) y emitthen s (c) accele (b) (d) ximur (c) at diff	ve the fold be fold ting peed (A ration Ai n heig 100 rerent	(c) a group the sons of proof proof proof proof proof proof proof the sons of	oton woton woton w	(d) leases of jet. (d) vith s vill be (d) ing free by it (d) rang	Coa a book a boo	80ms v an  u 1+1  be 20m li be lo	nt but not when tary d residu
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(a) Introduced in the second i	rease unifor jet flying ahead of it 20ms ⁻¹ nary nucle moves with (A - 1) If the follow objectile mot object through the citie has mojectiles a whose angle of thrown we is about	horizon In ord us of respect of speed of respect of speed of respect of respe	mly w ntally ler to (b) nass (in o (b) motion orizon m ran (b) ected (b) ocity 1	then n (b) at a l hit the 40ms no. 'A ppposi on with all dinge 12t 60m with s 50° 10ms 1	net force Decrease in the property of the pro	ase un of 2kr et wha ays by ction stant a	mg on iforming about show (c) y emitthen s (c) accele (b) (d) ximur (c) at diff	ve the fold be fold ting peed (A ration Ai n heig 100 rerent	(c) a group the sons of proof proof proof proof proof proof proof the sons of	oton woton woton w	(d) leases of jet. (d) vith s vill be (d) ing free by it (d) rang	Contabolic and a second a second and a second a second and a second a second and a second and a second and a	wante was a second with the second was a sec	nt but not when tary d residu
(a) Inta 38. A fighter is 800m: (a) (a) 39. A station nucleus is (a) 60. Which of (a) Pro (c) An (i). If a projectile (a) 3. A ball is projection (a) 3. Sr. 28.	rease unifor jet flying ahead of it 20ms ⁻¹ nary nucle moves with (A - 1) object through the following throug	horizon In ord us of respect is speed us ing is a ion own in h maximum re projegle is ith velo	mly w ntally ler to l (b) nass i u in o (b) motion motion m ran (b) ected	then n (b) at a l hit the 40ms no. 'A ppposi on with all dinge 12t 60m with s 50° 10ms 1	net force Decrease in the property of the pro	ase un of 2kr et wha ays by ction stant a	ing on ifforming about show (c) y emitthen s (c) (d) (d) (ximum (c) (c) (d) (d) (d) (d) (d) (d) (d) (d) (d) (d	it y y ve the 60n tting peed (A A A A 1000 1000 60° heigl	(c) a group the sons of proof proof proof proof proof proof proof the sons of	oton woton woton w	(d) leases of jet. (d) vith s vill be (d) ing free by it (d) rang	Contabolic and a second a second and a second a second and a second a second and a second and a second and a	wante was a second with the second was a sec	nt but not when tary d residu
(a) Introduction (a) Introduction (a) 39. A station nucleus 1 (a) 39. Which of (a) Projection (a) Projectile (a) 2. If four projectile (a) 2. 3. A ball is projection (a) 3.	rease unifor jet flying ahead of it 20ms ⁻¹ nary nucle moves with (A - 1) object through the following through the following through the following through the following through through thrown was about 0° 29, 30	horizon In ord us of respect is speed us ing is a ion own in h maximum re projegle is ith velo	mly w ntally ler to (b) nass (in o (b) motion orizon m ran (b) ected (b) ocity 1	then n (b) at a l the 40ms on with the 45° on the 4	net force Decrease in the target of target	ase un of 2kr wha ays by cetion stant a maximum maximu	ing on ifforming about show (c) y emitthen s (c) accele (b) (d) ximur (c) at diff (c) imum (c)	it y ve the lid be 60n tting peed (A - Tation Al Al Al 1000 60° heigl	(c) a grout the system of process	nd re peed of oton w oton w cct falli nese tained	(d)	Cola a book and a book a book and a book	80ms v an  u 1+1  be 20m ll be le	nt but not when tary d residu
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UNIT 01	FORCE AND MOTIO		Zayan Publisher
44. If an electron mov	ing with velocity 'v' under	goes an elastic collisi	on with stationary alpha
	lectron after the collision will	(c) 2V	(d) Zero
(a) V	(b) -V e of the shell fired at angle 45		
(a) 2km	(b) 3km	(c) 4km	(d) 5km
46 If a 4kg dog jumps	out with velocity 2ms-1 from		
backward with veloc	city		
(a) 0.1ms ⁻¹	(b) 0.2ms ⁻¹	(c) 0.4ms ⁻¹	(d) 0.9ms ⁻¹
47. A particle of mass i	moving eastward with a spe	ed v collides with ano	ther particle of same mass
	with same speed 'v'. the two	particles will move wil	th velocity.
(a) $\sqrt{2}v$ north-east	(b) $\sqrt{2}v$ north-west	(c) $\frac{v}{\sqrt{2}}$ north-east	(d) $\frac{v}{\sqrt{2}}$ north-west
	ing is not true for a moving l	body	gangeraan a come
(a) Displacement		(b) Velocity may	t may be greater than distance
(c) Acceleration n	nay be zero  vertically upward with velo	(d) Displacement	lge of a cliff After how law
	tom of the cliff 15m below the		ige of a citi. After now 10h
(a) 2sec	(b) 3sec	(c) 4sec	(d) 5sec
50. If a 1000kg is broug	ght to rest by retarding force	e of 103N in 20 second	ds then initial velocity of th
car will be.	and training the purity and an array of		
(a) 10ms ⁻¹	(b) 20ms ⁻¹	(c) 200ms ⁻¹	(d) $2x10^{-3}$ m/s
51. Head rest of a car s		a Slay looks for 0.20 a	in the K001, to sout A 2
(a) Head injury	(b) Neck injury	(c) Brain injury	(d) Hear injury
	5 m and time t=10 seconds,	(c) 2.5 m/s	(d) 3 m/s
(a) 12.5 m/s	(b) 1.5 m/s		(0) 5 111/3
53. If we are standing i	n bus and when driver apple pushes backwards	(b) Pseudo force	e pushes forwards
(a) Peal force	nushes backwards	(d) Real force p	ushes forwards
54 If we are moving w	ith constant velocity frame	then the inertial state	is same as
(a) Rest frame		(b) Uniformly a	ccelerated frame
(c) Non-inertia	I frame	(d) All of these	onlastados for the
55. Average velocity is	defined as	4.	Andrea A Freibi
(a) Displaceme	ent/time	(b) Distance/tin (d) Displaceme	ne v time
(c) Distance ×	time	(d) Displaceme	f height 5 m then just bef
56. When a stone is th	rown horizontally with 2 i	m/s from a bunding o	
hitting ground its a	cceleration is:	(a) 12 m/c ²	(d) $7.6 \text{ m/s}^2$
(a) $12 \text{ m/s}^2$	(b) 9.8 m/s ²	(c) 13 m/s	m towards west. It takes
57. A car travels 30 n	(b) 9.8 m/s ² n toward east, then it take	and the second second	The second second to
seconds. Its averag	(b) -1/5 m/s	(c) 7/5 m/s	(d) -5 m/s
(a) -10 m/s	(b) -1/3 m/s	tile motion is:	
58. Horizontal velocity	vs time graph for a projec	(b) Horizontal	straight line
(a) Straight lin	redicate a second	(d) Non-linear	
(c) Parabola			780 (0)

(a) Straight line
(b) Horizontal straight line
(c) Parabola

Sr. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58.

Ans: b c c a d b b b b b a a a b b b

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**WORK AND ENERGY** Zayan Publisher UNIT 02  $\rangle$ **WORK AND ENERGY** PRACTICE TEST NO. 1 Work done on a body is negative. If the angle between force and displacement is: (a) Less than 90 (b) Equal to 90 (c) Greater than 90 (d) Zero (a) Less many (d) Zero

If force-displacement graph for a moving car on a straight road is shown in figure below then its change in K.E will be 50 5 d 10 (b) 200J (c) 5001 (d) 1000J 1 The ratio of unit of power to unit of work is the unit of: (a) Mass (b) Length (c) Time 4. If a pump lift 100m³ water from ground to a height of 10m in 5min then its power will be? (d) Frequency (b) 50KW (c) 33KW 5. If reference point is choosen at infinity the gravitational P.E of a body on the surface of earth given as (d) all 6. If a body moving with the velocity 4m/s has K.E 16J. What will be its K.E if it is moving with (a) 2J (b) 5J (c) 9J 7. A satellite is moving in a circular path with uniform speed then work done on the satellite is: (b) Negative (c) Positive and maximum & A body falls from a tower. After falling a distance d the velocity of the body will be? (b)  $\sqrt{gd/2}$ 9. A body falls freely under gravity, its velocity is v when it has lost a P.E of U. Then the mass of 10. In the presence of air friction the relation for falling body is: (c) U/2v (b)  $mgh = \frac{1}{2}mv^2 + fh$ (c)  $mgh=fh-\frac{1}{2}mv^2$ II. ln an explosion a bomb breaks up into two pieces of unequal masses. In this case: (a) Lighter part will have more momentum (b) Heavier will have more momentum (c) Both parts will have equal K.E. Mork done is 2. A body moves a distance of 10m along a straight line under the action of a force of 5N. If the work done is 25J, the angle which the force makes with the direction of motion of body is:

(a)  $0^{\circ}$  (d)  $60^{\circ}$ 

50

10. 11. 12.

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b

13. A light and heavy body have equal momentum. Which one has greater K.E?

(a) Heavy body

(b) Light body

(c) K.E are equal

Data is (d) incomplete

14. A light and heavy body have equal K.E, Which one has a greater momentum?

(a) Light body (b) Heavy body (c) Bothe have equal momentum

(d) It is not possible to say anything without additional information

15. The consumption of energy by 60 watt bulb in 2s is:

(b) 10J

(c) 30J

(d) 1201

16. The engine of the car applies the force of 2000 N by which it moves with a uniform velocity of 72km/h. The power delivered by engine is:

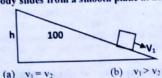
(a) 2kW

(b) 144kW

(c) 44kW

(d) 40kW

17. A body slides from a smooth plane at height h as shown figure below then:



(c)  $v_1 < v_2$ 

(d)  $v_1 = v_2 = 0$ 

18. Which among the following is a form of energy:

(a) Light

(b) Momentum

(c) Power

(d) Pressure

19. A man does a given amount of work in 10s. Another man does the same amount of work in 20s. The ratio of the output power of first man to second man is:

(b) 2/1

(c) ½ (d) None of these

20. Dimensions of power are

(a) ML2T-3

(b) ML²T⁻²

(c) MLT

(d) MLT-2

21. In which of the following case work done is zero

(a) Work done by a man pulling a cart on smooth surface

(b) Work done by engine accelerating the car

Work done in pushing a rigid wall

(d) Work done by gravity on a falling body 22. If a body of mass 2kg is raised to a height of 5m then work done by gravity will be

(a) 10J

(b) 100J

(c) -100J

23. Type of energies possessed by moving car and stretched spring are respectively

(a) P.E and K.E

(b) K.E and P.E

(c) K.E and K.E

(d) P.E and P.E

24. Work done by gravity on a simple pendulum in one vibration is

(a) Zero

(b) Positive

(d) Depends upon initial position

25. If a block of mass 20kg is pushed along the surface of a inclined plane upto a height of 20m from the ground then T.E possessed by block at the top of the plane will be

(c) 6000J

26. If electron, proton, neutron and alpha particle are moving with same K.E then which one is

moving faster (a) Electron

(b) Proton

(c) Neutron

d

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WORK AND ENERGY

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 $27.11 \vec{F}$  is force required to sustain the motion of a car with velocity  $\vec{v}$  then power of the engine will

(d) Zero

28. At which of the following angle between force and displacement the work done will be negative 29. If velocity of a body of mass 10kg is increased from 5ms⁻¹ to 10ms⁻¹ then work done on the body is

(d) 920J

30. A 70 kg man run upstairs in 10sec If vertical height of stairs is 8m then his power will be about (d) 34KW

11. If force-displacement graph for a body is shown in the figure below then the change in energy of the body will be

(b) 400J (a) 200J

(c) 500J

32. If a 1KW mater pulls a load by a distance 20m in 40sec then force exerted by the motor is (b) 2000N (c) 4000N (d) 5000N

33 A brick of mass 2.5kg falls from height 6m above the ground After covering a distance 2m its K.E.

(d) 150J

34. Work done in staking ten bricks one on the top of another if mass of each bricks is 'm' and thickness is 'h'

(a) mgh

(b) 10mgh

(b) 50J

(c) 25mgh

(c) 100J

35. Change in kinetic energy of a car with time is shown in figure below. Ignoring frictional forces what is power of the engine?



(a) 200W

(b) 400W

(c) 16x104W

(d) zero

36. When a spring is stretched, work done by stretching force is (a) Positive

(b) Negative (c) Zero (d) None of these 37. Man moves a roller through a distance of 20 m. 10N of applied force is inclined of 60° of direction of motion what will be the work done by the man.

(a) 100 J

(b) 50J

(c) -100J

(d) -50J

(a) Torque (c) Power

(b) Momentum

(d) Angular momentum

39. KE of body is increased by 44%, What is the percentage increase in the momentum

(b) 20%

(c) 30%

40. Work done by a conservation force in a complete cycle is:

(a) Zero

(b) More than zero (c) Less than zero (d) None of these

41. Work is done on a body if: (a) Its energy increases

(b) Its energy decreases

(c) It covers displacement in direction of force (d) All of these

42. When two electrons are brought closer to each other then their P.E:

(a) Increase

(b) Decrease

(c) Remain same

(d) May increase or decrease

43. A stationary particle explodes into two particles of masses m₁ and m₂ which moves in opposite directions with velocities v1 and v2. The ratio of their K.E: (b)  $m_1 v_1 / m_2 v_2$ (c)  $m_1/m_2$ 

weighs 20g the power of gun is:

44. From an automatic gun a man fires 360 bullet per minute with a speed of 360 km/h. If each

(d) 150W

(a) 600 W (b) 300 W 45. It is easier to push or pull an object when force is

(a) Parallel to displacement

(b) Perpendicular to displacement

(c) Anti-parallel to displacement

(d) Both a and c

46. If a 100kg car is accelerated from rest to a velocity 10ms-1 then work done by engine will be

(a) 1KJ

(b) 0.5KJ (c) 5KJ

47. If K.E of a body having velocity v and momentum P is X then K.E of th body having velocity '2v' and momentum 2p will be

(a) X

(b) 2X (c) 4X

48. The K.E of a body of mass 2kg and momentum of 2Ns is:

(b) 3J

(c) 2J

49. A variable force F = x is applied what will be the work done in moving the particle from x = 0 to 1:

(a) 2 J

(b) 1 J

(c) 0.5 J

(d) 5 J

50. A body of mass 10 kg moving at a height of 2m, with uniform speed of 2 m/s has total energy.

(b) 216 J

(c) 392 J

Sr.	38.	39.	40.	41.	42.	43.	46	45.	46.	47.	48. 49. 50. c c b	輕
Ans:	a	b	a	d	a	d	a	a	С	a	cc	_

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## UNIT 02 PRACTICE TEST NO. 2

WORK AND ENERGY

An object is displaced from point A(0,0,1)m to point B(1,4,3)m under a constant force F = (l + 2l + 3k), find the work done by this force in this process (b) 15 J

(c) 0

Two forces of 5N and 15N are working on a body in opposite direction. If body displaced by 5m in direction of net force, what will be the work done by net force: (b) -50 J (c) 25 J

An object of mass 'm' is projected vertically upward with initial velocity v then the maximum height reached by object is directly proportional to

Two bodies of masses 2kg and 8kg are placed at different heights as shown in figure below then the ratio of their potential energies at these points will be



(a) 1:1 (b) 1:2

5. A bullet of mass m is moving horizontally with speed v is stopped by sand in its path. If it covers distance d before coming to rest then average retarding force acting on the bullet will be

6. A ball of mass 1/2kg is released from a height of 50m and after rebound it. Reaches to height of 10m. The percentage loss in energy will be

(a) 20%

(b) 40%

(c) 60%

7. If a boat propeller engine exerts a force of 100N to overcome the drag force and move the boat with constant velocity 20ms-1 then power of the engine will be (b) 2000W

(c) 5000W

8. A ball of mass 1kg rolls down from a smooth surface as shown in figure below then its speed at



(a) 1.4ms⁻¹

(b) 7ms⁻¹

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9. A body of mass 2kg is thrown vertically upward with kinetic energy 300J then maximum height (a) 5m

10. Four motors having different powers are kept running for different time. Which motor does the

(60)	Power	Time
(a)	100W	500sec
(b)	200W	2 min
(c)	500W	5 min
(d)	1000W	200sec

				Total Control of		all products		
b 3.		4	5.	6.	7.	8.	9.	10.
a	b	b	b	d	b	c	c.	d
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(b) Displacement covered by body

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23. Necessary condition for work is being done on the body is

(c) Displacement is covered by body in the direction of force
 (d) Displacement is covered by body perpendicular to force

(a) Force applied on the body

WORK AND ENER	RGY			
24. Scalar product of force and velocity is: (b) Work			2	Zayan Publishe
24. Scalar production (b) Work	(c)	Momentum	4	Derrich Spirit
(a) which can pump 20 kg of	water t	a haight affa	(d)	Power
25. The power of 10 ³ watt (b) $4 \times 10^3$ watt	(c)	20 x 10 ³ watt	11 10 105 WI	ll be:
(a) 2 x 10 want 26. If a man increase his speed by 2 m/s, his K.E b	ecomes	4 times, the orig	(D)	60 x 10 ³ watt
26. If a mas (b) 1 m/s	(c)	0.5 m/s	(d)	4 m/s
the increase in the K.E of a body is 22%, the	n the in	crease in the mo	mentum u	d m/s
(a) 22% (b) 44%	(c)	300%	(d)	10%
a A 1 kg body falls from 100m high tower. After	falling ?	20m its K.E will	be:	1070
			(d)	80001
At which angle between F and d work done wil	l be min	imum?	(-)	
(a) 0 (b) 30	(C)	30	(d)	45°
If a water falls from dam into a turbine wheel 1	19.6m b	elow. Then the v	elocity of	water at turbine:
(a) 29.2m/s (b) 9.8 m/s	(c)	98m/s	(4)	19.6m/s
If velocity of a body is twice of previous velocity	y, then I	C.E will become		
(a) 2 times (b) I times	(c)	½ times	(d)	4 times
A spring with spring constant K when stretche stretched by 4cm. The potential energy will be:	ed thro	ugh Icm, the po	tential en	ergy is U. If it is
		0.11		
	(c)	8 U	(d)	2 U
A particle is acted upon by a force of constant velocity of the particle, the motion of the particl	magnii	ude which is a	ways perp	endicular to the
(a) Its acceleration is constant	(c)	Its velocity is o	. It follows	that:
(b) It moves in a straight line		Its K.E is cons		
A ball of mass m moves with speed v and stri	kes a w	all having infin	ite mass a	nd roturns with
same speed then the work done by the ball on th	ne wall is	s:	ite mass a	nd returns with
(a) Zero (b) m/v J	(c)	mv I	(d)	v/m I
A 50kg man with 20kg load on his head climbs	up 20 s	teps of 0.25m h	eight each.	The work done
in cumbing is:			y family	
(a) 100J (b) 5 J	(c)	3430J	(d)	350J
You lift a heavy book from the floor of the room	and ke	ep it in the bool	shelf hav	ing a height 2m.
In this process you take 5s. the work done by you	u will de	epend on:		
(a) Mass of the book and time taken	(c)	Mass of the boo	ok, height o	of book shelf and
(b) Height of book shelf and time taken		time taken	20	
(b) Height of book shelf and time taken	(d)	Weight of the	book and	height of book
What is velocity at mean position when the		shelf		
What is velocity at mean position when pendulus shown in the fig below.	m move	s from extreme	to mean po	sition as
The highest the second				
(1)				
ar to each other has the west done on the bear		clocity are per-		
(0)			Division!	
The second secon				
- 5c				
(a) 0.1m/s (b) 0.5m/s	-		(1)	lla
hp is equal to: (a) 0.1m/s (b) 0.5m/s	(c)	l m/s	(d) 1.4	łm/s
(4) //61		246KW	(4) 74	6MWh
(b) 746W	(c)	746KW	(d) 74	OIVI WII
24. 25. 26 27 29 20 20		2 33 34	35. 36.	37. 38.
d 23. 26. 27. 28. 29. 30.	State of the last	ALIEN SERVICE SERVICES	c d	c b
a a d a b d	d	a d a	- a	

39. A 4kg body is thrown vertically upward from the ground with a velocity of 5ms-1. Its K.E just

before hitting the ground is: (b) 6W (a) 8W

(c) 10W

(d) 14W

40. 1MWh is equal to (a)  $36x10^8$ J

(b) 3.6J

(c) 3.6MJ

(d) 3.6x1091

41. A 2kg body falls from a high tower. After falling 100m, its K.E will be:

(a) 0.2KJ

(b) 1KJ

(c) 2KJ

(d) 20KJ

42. Four particles have same K.E. then which has maximum momentum:

(a) Proton

(b) Electron

(c) Positron

(d) α-particle

43. If escape velocity is v1 for a 10kg mass and v2 for a 20kg mass then (c) V1 < V2 (b)  $v_1 > v_2$ (a)  $v_1 = v_2$ 

(d)  $v_1 >> v_2$ 

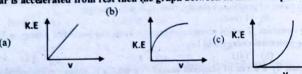
44. If velocity of body becomes n times then its K.E will become

(c) 2n-times

(d) vn-times

K.E

, (b) n²-times (a) n-times 45. A car is accelerated from rest then the graph between its K.E and speed will be



46. A boat propeller moving with velocity 10m/s has maximum power 500W then the force exerted by the propeller is:

(a) 5N

(b) 50N

(c) 500N

47. If a body covers a displacement 10m with rate of change of momentum 10kg ms-2, then work on the body is

(c) 100J

48. A car is moving with uniform velocity then the work done by engine, friction, and net force are

..... respectively (a) +ve.-ve.zero

(b) -ve.zero,+ve

(c) -ve,zero,+ve

(d) +ve,zero,-ve

49. Force-displacement graph of a body is shown in the figure below. Then change in energy of the body is



(a) 40J

(b) 300J

(c) 400J

50. If acceleration and velocity are perpendicular to each other then the work done on the body is:

(a) Positive

(b) Negative

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b d d d a b c b c a	E FULL	M. The	Silver Tel	Man Inch	OF THE	対ける			46.	47.	48.	
	をサールは	h	d	d	d	а	b	C	b	c	a	

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PRACTI	CF	TEST	NO	2
			NU.	. 3

Which of the following is the greater value of work?

(a) 100J

(b) 300J

(c) -300J

(d) -500J

(a) -500J A person holding a bag of 10kg moving with the velocity of 20m/s then the work done by gravity

(a) 10Nm

(b) 20Nm

(c) 200Nm

(d) Zero

Which of the following is not a unit of power? (b) Horse power (c) erg/s (d) W-hour

WORK AND ENERGY

If momentum of the body is increased by 100% then its K.E will increase by: (b) 200%

(c) 300%

(d) 400%

(a) 100% 5. Area under the graph between force and velocity will give: (a) Work done

(b) Power

(c) K.E

(d) Total energy

When a person lifts a body from the ground the work done by his applied force is?

(a) Positive

(b) Negative

(c) Zero

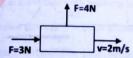
(d) 1

Work done by simple pendulum in one complete oscillation is:

(a) Mgd

(c) Zero

What is the power of the body if forces acting on a moving body are shown in the figure below:



(b) 6W

(c) 10W

(d) 14W

9. A diver weighing 200N jumps from a 10m high board. What will be its velocity when its height is

(a) 3m/s

(b) 6m/s

(c) 9m/s

(d) 12m/s

10. Which of the following is a scalar quantity:

(a) Work

(b) Electric field

(c) Acceleration

(d) Displacement 11. A force of 5N acts on a 15kg body initially at rest. The work done by the force during the first second of motion of the body is:

(a) 75J (b) 5/6J

(d) 5J

12. A force F = 81 + 35 newton is applied over a particle which displaces it from its origin to the

(b) 11J 13. Two bodies of masses m₁ and m₂ have equal K.E. If p₁ and p₂ are their respective momentum, then ratio p1:p2 is equal to:

(a). m₁:m₂

(b)  $m_1^2:m_2^2$ 

point r = 2i - 1j meters. The work done on the particle is:

(c)  $\sqrt{m_2}$ :  $\sqrt{m_1}$ 

 $\sqrt{m_1}:\sqrt{m_2}$ 

14. A force of  $2\hat{i} + 4\hat{j} + 6\hat{k}$  N gives displacement of  $10\hat{j}$ m. The work done is:

15. Energy required to accelerate a car from 10 to 20ms. compared with that required to accelerate from 0 to 10 m/s in the same interval of time covering the same distance is:

(a) Three times (b) Twice (c) Four times

(d) Same

16. A body falls from the height h. After falling a distance S its speed will be: (d)  $\sqrt{2g(S-h)}$ (c)  $\sqrt{2g(h-S)}$ 

(a) One fourth the initial height

(b) Half the initial height

(c) Three fourth the initial height

(d) None of these

18. A force of  $2\mathbf{i} + 3\mathbf{j} + 4\hat{k}$  N acts on a body for 4s, produces a displacement of  $3\mathbf{i} + 4\mathbf{j} + 5\hat{k}$  m. The power is: (c) 4.5 W (d) 6.5 W (b) 7.5 W (a) 9.5 W

19. Work done on the body depends upon

Force applied on the body

Displacement covered by the body

Angle between force and displacement

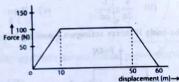
All of these

20. A man pushes a lawn mover through a distance 50m by a force 10N which makes an angle 45° with horizontal, what is work done by man

(b) 350J

(c) 450J

21. If force-displacement graph for a body is shown in the figure below then work done on the body



(a) Zero

(b) 5KJ

(c) 6KJ

(d) 10KJ

22. Absolute P.E of an object is minimum

(a) On the surface of earth

(b) At infinity

(d) At a height equal to radius of earth (c) At the center of earth

23. Energy consumed by a 500W bulb in 10h is

(b) 5KWh (a) 0.5KWh

(c) 5KJ

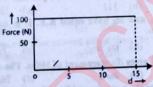
(d) 50MJ

24. If 5000kg aero plane is moving in a vertical circle of radius 1km then work done by gravity during its motion from lowest point to highest point will be

 $-5 \times 10^7$  (c)

 $-1 \times 10^{8}$ 

25. Force-displacement graph for a falling body is shown in the figure below. What is gain in K.E of the body after 10m.



(d) 1.5KJ

(b) 1KJ (c) 1.5J 26. show force-displacement graph is shown in the figure below What is net change in energy of a bod

iy? (a) 5J	(b)	50J			(c) 1	50J	1	(d) Zero
Sr. 17.	18. 1	9.	20.	21.	22.	23.	24.	25. d
Ans: b	a	d	b	b	a	b	C	0

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WORK AND ENERGY

27. A 2kg ball moving with velocity 10ms⁻¹ is brought to rest in 20 sec What is work done on the ball? (c) -100J 18. If both mass and velocity of a body are doubled then its K.E will become (d) -200J

(a) Double (c) Eight times 29. If a half kg ball is moving with constant velocity  $(4i+3j)ms^{-1}$  then its K.E will be (d) Sixteen times

(a) 3.7J (c) 12.5J (d) 15.751

30. If a car is decelerating down from a hill station then its K.E and P.E.

(a) Increase and decrease (b) Decrease and increase (c) Both decrease

(d) Both increase

31. If a 1kg body is moving with kinetic energy 200J then its momentum will be (a) 10 N.s (b) 20 N.s

(c) 25 N.s. (d) 50 N.s. 32. If an object of mass 2kg dropped from a height 15m then its velocity at a height 10 will be

(a) 4ms-1 33. Effect of work is equal to

(b) 10ms⁻¹

(c) 14ms⁻¹

(d) 19ms⁻¹

(a) Change in total energy

(b) Change in kinetic energy (d) Both a & b

(c) Change in power

34. If a horse pulls a cart, work done by horse is (a) Negative

(b) Zero (c) Positive

(d) None of these

35. If momentum is increased by 20% then K.E. increase by: (c) 44%

(a) 20% (b) 40%

(d) 86%

36. A body of mass 10 kg is travelling with uniform speed of 5 m/s. Its kinetic energy is (a) 125 J (b) 250 J (c) 500 J (d) 255 J 37. A stone of 1 kg is thrown upward it reaches a max height of 5m, work done by the gravity is:

(a) 50 J (b) 49 J

(c) -49 J

(d) 55 J

38. The linear momentum is increased by 10%, percentage change in the kinetic energy will be: (a) 21% (b) 11% (c) 22% (d) 10%

39. The SI unit of power is? (a) Hz (b) Sec

(c) Watt

(d) Joules

40. A block of mass 50 kg slide over a horizontal distance of 1 m, if the coefficient of between the surfaces is 0.2 then work done against friction is (a) 98J (d) 34J

(b) 721

(c) 56J

41. A block of mass 60 kg just slides over a horizontal distance of 0.9 m. If the coefficient of friction

(a) 79.4 J (b) 97.54 J (c) 105.25 J 42. The value of acceleration due to gravity on moon is _ of earth:

(a) One forth

(b) 1/10 th

between their surfaces is 0.15 then work done against friction will be:

(c) 2/3

(d) 1/6

(d) 81 J

(d) 12 J

43. If force is F = 4i - 2j and displacement is d = 3i + 4j, the work done will be: (a) 4 J (b) 8 J (c) 2 J

44. In which of the following the work is done by the variable force (a) Extension produced in spring

(b) Rocket moving away from earth

(c) Charges moving toward each other

(d) All of these

45. When mass and speed of the body are doubled, K.E of body will become: (a) 4 times (b) 8 times

46. A neutron of mass 1.67x10⁻²⁷kg covers a distance 12m in 3.6x10⁻⁴ sec with uniform speed what is

(a) 9.3x10⁻⁹J

(b) 9.3x10⁻¹⁴J

(c) 9.3x10⁻¹⁹J

(d) 9.3x10⁻²⁹J

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-	THE RESERVE TO SERVE	The second second second second second	1 C Ame to 10mm	then went 1
17.	When velocity of body of	mass 10kg is incr	eased from 4ms to 10ms	then work done on the
	body is	Shifts Six as 10	(a) 3201	(4) 1201

(b) 220J

48. A particle moves from point P(1,2,3) to Q(2,1,4) under the action of a constant force F=(2i+j+k)work done by force is:

(a) 2J

49. An object is displaced from point A (2,3,4) m to point B (1,2,3) m under a constant force F (2i+3j+4k). find the work done by this force in this process:

(a) 9 J

(b) 0

(d) 20 J

50. Area of force-displacement curve gives the information about

(a) Power

(b) Impulse

(c) Force

(d) Work

- C-	4750	48	49	50
Aus;	d	a	c	d`

## PRACTICE TEST NO. 4

1. At which of the following angle between force and displacement, work is maximum:

(a) 20

(b) 40

(c) 60

2. A force of 40N acts on a body and it covers the displacement 2m. If the work done on the body 40J then angle between force and displacement is

(a)  $\pi/3$ rad

(b)  $\pi/2$ rad

(c) π/6rad

(d)  $\pi/2$ rad

3. If force-displacement graph for different bodies is shown in the figure below then the work done is maximum for:



4. Which of the following force is not a conservative force?

(a) Elastic force

(b) Friction

(c) Gravitational force

(d) Electric force

5. A 1000W motor runs for 1h then work done by the motor is:

(a) 3.6J

(b) 3.6KJ

(c) 3.6MJ

6. Which of the following is used as unit of electrical energy? (c) erg

(b) Ev

7. Two bodies of equal masses are moving with velocities 2m/s and 6m/s then ration between their K.E will be: (c) 1:9

(b) 3:1

(a) 1:3 8. For which of the following force the work done depends on the path followed

(a) Electric force

(b) Gravitational force

(c) Frictional force

(d) Elastic force

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1	Ans:	a	a	U		V		-p	

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Herry Nost Rome on the	rith v	placity 36Km/h	LINE IN	All Zine	Zaytai Pub
A 1000kg car is moving w	on ref	arding force as	when b	reaks are appl	ied, it covers 10m dietar
before coming to rest. The	(1-)	500N	ting on the		Tom distar
(a) 50N	(0)	300N	(c)	5000N	(d) 2000N
(a) 50N (b) If a force required to acce	elerate	e the particle ir	om rest t	o velocity v is	F. Then force required
	veloci	ty Zv in same d			- required
					(d) 4F
(a) F=2i is acting on a	a car	moving with co	nstant ve	locity V=3i+5i	then power of the and
(a) 6	(b)	16	(c)	10	(d) Zero
t. done may be equal	to:				(d) Zero
			(b)	Change in ele	ectric P F
(a) Change in P.E			(d)	All of theses	
3. If a 1000 kg car accelerate	es fro	m rest to a veloc	city 72Kn	n/h in 4sec the	n the news-
engine is:				- III voce the	i the power produced
engine B. (a) 5KW	(b)	50KW	(c)	500KW	(4) 500015111
Two bodies of masses 1kg	and 4	kg are moving	with ean	al K F The we	(d) 5000KW
momentum is:			cqu	ai R.E. The ra	ttio of their linear
(a) 1:4	(b)	4:1	(c)	1:2	the state of the state of
A man pushes a wall and	falls to	displace it He	does	1.2	(d) 2:1
(a) Negative work	HI H	a distributed in the	(c)	Dogities has	nativities signed as he to
(b) No work				Maximum wo	ot maximum work
A body of mass 10kg is d	ronn	ed to the grow	nd from	the beinker	ork
gravitational force is:	торр	ed to the groun	iu irom	the neight of	10m. the work done b
(a) -980J	(b)	980J		100 1	nd to again the World
The same retarding force			(c)	490 J	(d) -490J
The same retarding force	15 ap	philed to stop a	train. T	he train stops	after 80m, If the spe
train is doubled under sam	ie ret	arding force sto	opping dis	stance will be:	
	(D)	Four times	(c)	Doubled	(d) The same
If force and displacement	of par	ticle in directio	n of force	e are doubled.	Work will become:
(a) One forth times	(b)	4 times	(c)	Half	(d) Double
Two bodies of masses 1kg	and	5kg are dropp	ed gently	from the top	of the tower. At the
seem nom the ground, bot	in the	bodies will hav	e the san	ne (ignoring ai	r friction):
(a) VEIOCITY	(D)	otal energy	(0)	V C	(1) 14
Two bodies of different mare the ratio:	asses	m, and m, hav	e equal	momentum. T	heir Kinetic energies
				The State of the S	the grade of the grade of
(a) $m_1^2:m_2^2$	(b)	$\sqrt{m_1}$ : $\sqrt{m_2}$	(c)	marm.	(4)
I wo Dodies are thrown ve	rtical	by unward with	thair i-	tial annual.	(d) m ₁ :m ₂
of the maximum heights at	taine	by them is:	their in	tiai speeds in	the ratio 2:3 then the
(a) 1:1 A body of mass 2kg is droground its velocity is:	(L)	22			

(a) 7m/s (b) 49m/s (c) 12m/s (d) 10m/s

23. A force F stops a body of mass m moving with velocity v in a distance S. The force required to stop a body double the mass moving with double the velocity in the same distance is:

24. In which case does the potential energy decrease:

(a) On compressing a spring On stretching a spring

(b) On the rising of an air bubble in the water (d) On moving a body parallel the gravitational force

	-8F					, mg							
20 10 11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
9. 10. 11. c d a	d	b	С	b	b	b	b	a	C	d	d	b	d

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**WORK AND ENERGY** 

UNIT 02	ck of ma	en 211	Zayan Pub
UNIT 02  11. A horizontal force 10N acts on a stationary block will be the face. After 5sec the K.E of block will be	or ma	ss 2 kg plac	ed on a horizontal smooth
41. A horizontal force to the K.E of block will be surface. After 5sec the K.E of block will be (b) 125J	(c)	225J	(d) 625J

42. Which of the following force (a) Centripetal force (c) Gravitational force

(b) Magnetic force (d) Gravitational force on satellite

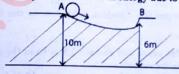
(b) Magnetic is lying on the surface of earth then the energy required to move the object out of earth gravitational field is

44. Two balls of mass 10g and 40g are moving with same K.E the ratio f their linear momentum will

(d) 16:1

45. If momentum of body is increase by 3% then its K.E will be increased by (b) 3% (c) 6%

46 A ball of mass 0.5kg starts rolling on a rough curved surface from point (A) as shown in the foure below. If it comes to rest at point B then loss in energy due to friction will be



(b) 20J (c) 50J (d) Zero 47. A 600N student run upstairs 50 steps each of height 10cm in 20 seconds. What is power of the

(a) 50W (b) 150W (c) 250W (d) 1500W

48. An object of mass 'm' is moving in a circular path of radius 'r' with uniform speed v then work done on it will be (a)  $mv^2$ 

(b) 2mv² 49. Which of the following is not unit of power?

(a) Horse power

May increase or

(c) kWh

(d) Zero (d) Nm/s

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(b) Kilowatt 50. In a simple pendulum work done by the tension force is (a) Positive

(b) Negative (c) Zero

(d) None of these

Contract of the contract of th	Aller and a second								
41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
Sr. 41. Ans: b	c	d	b	С	b	b	d	c	c

# PRACTICE TEST NO. 5

	:- 10 the	force on	the cycle due to	the road is 200 m
1. A cyclist come to sk	idding stop in 10 m, the n. How much work does th	ne cycle do	on the road	and is 200 N and
	(b) -2000 J	(c)	0	(d) 200 J
(a) 2000 J	f the force and displaceme		posite, work don	e is
	(b) Positive	(c)	Zero	(d) None of these
(a) Negative		(0)	Zero	(d) None of these
3. An electric filament		(b)	A.C supply only	
(a) D.C supply of			All of these	
(c) Battery supp	2i + 3j + 4k is applied on			vork done to mous
	21 + 3] + 4K is applied on	a body w		body
5 m in z-direction:	(b) 45 J	(c)	10 J	(d) 20 J
(a) 0	0 kg is moving with veloc	(-)		
5. A particle of mass 1	0 kg is moving with veloc	le from Y	- 4 to r = 9	meement. The work don
	the displacement of partic	(c)	1000 J	(d) 2500 J
(a) 1250 J	(b) 3500 J			
	N is acting in y direction,	work don	e by this lorce t	o move the particle from
= 0  to y = 1 m		(0)	2 J	(d) 1.5 J
(a) 0.5 J	(b) 11			
<ol><li>A 4kg eagle picks t</li></ol>	up a 75g snake and raises	it 2.5 m	irom the groun	u to a branch. What is th
work done by the ea	agle on the snake?	(0)	18.75 J	(d) 187.5 J
(a) 100 J	(b) 1.875 J	which co	ness displaceme	
	10 N is applied on a body	which ca	uses displaceme	it of 12 cm what win be to
work done:		(4)	1.2 J	(d) 18 J
(a) 120 J	(b) 12 J	(c)	tent velocity W	
9. When a man walks	on a surface horizontally	with cons	Contact force	is zero
(a) Friction is	zero		All of these	is zero
(c) Gravity is	zero	no/ itali	notic energy inc	reases by
	n of body increased by 20	0%, Its Ki	) 400%	(d) 800%
(a) 200 %	(b) 300 %	f	a height of 1 kg	m. It hits the ground wit
11. Consider a drop o	f water of mass 1 gm fal	ling irom	a neight of 1 k	air is was a standard
speed of 50 m/s, ta	ke $g = 10 \text{ m/s}^2$ . The work	done by r	8.75 J	(d) -8.5 J
(a) -8.25 J	(b) -8.75 J	(c	0.733	
12. 1 Joule is equal to:			10 ⁶ erg	(d) 10 ⁷ erg
(a) 10 ⁴ erg	(b) 10 ⁵ erg	(0	() 10 erg	(0)
13. At which angle wo	rk done is minimum:		0 4	(d) 180 degree
(a) 15 degree	(b) 90 degree		c) 0 degree	(6)
14. If mass and speed	both are doubled kinetic	energy w	b) Increase 6 ti	imes
(a) Increase 4	times		o) moreuse s	
(c) Increase 8	times	(	d) Increase 10	+ 6k)m under a force F=
15. An object is displ	times aced from position vector	$\mathbf{r}_1 = (2\mathbf{i} +$	$3j) \mathbf{m} \text{ to } \mathbf{r}_2 = (4)$	T OKJIII UIII
2i)N. Find the wo	rk done by this force:			(d) -83 J
(a) 10J	(b) -4J	The state of	(c) 83J	
16. Which is the unit	of energy:			(d) All of these
(a) Joule	(b) Erg		(c) Unit (Kwh)	(6)
(a) soulc				
				12. 13. 14. 15. 16.
d cur	1. 2. 3. 4. 5. 6.	7. 8.	9. 10. 11.	
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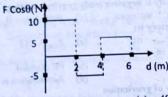
UNIT be is pulling a cart of mass 50 kg in the horse.  17. A horse is pulling a cart of mass 50 kg in the horse, also what will be the work done by the horse.	rizonta	direction is a		Zayan Publisher
17. A horse is pulling a cart of mass 50 kg in the horse, m then what will be the work done by the horse, m then what will be the work done by the horse.		an ection, if the	distanc	ce travelled is 200
m their 10001 (b) -1000J	(c)	7.000		
(a) holds a bucket by applying force 10 N.  18. A man holds a bucket by applying force 10 N.  18. A man holds a bucket by applying force 10 N.  18. A man holds a bucket by applying force 10 N.	A 48	Zero	(d)	500J
18. A man holds a bucket by applying torce 10 kg.  vertical distance of 10 m, find out the net work do	o a a	moves a horizon	tal dist	tance of 5 m and
vertical distance (b) 150 J				or o in and
		50 J	(d)	200 I
(a) 100 mass 5 g is thrown downward with	veloci	ty 10 m/s from he	ight 19	5m It name
		(P TO HES)		It penetrates
(-) 7 (0) 2.23 )	(c)	251	(d)	2.75 J
20. Two bodies of mass m and 4m moving with san	ne kin	etic energy, ratio	hotwo	2.13 ]
will be:		8,7, 14110	betwe	en their velocities
(a) 4:1	(c)	1:4	(1)	
when work done by force of gravity is negative (	only gr	ravity is action)	(d)	1:2
(a) K E decreases (D) P.E. increases	(c)	Both A and B		
22. Maximum power delivered by battery is:	(0)	Both A and B	(d)	None of these
(a) $P_{\text{max}} = E^2/4r$ (b) $P_{\text{max}} = rtE^2$	(0)	D 1000		
23. If the speed of body is doubled, . en:	(c)	$P_{max} = VIT$	(d)	Unlimited
(a) K.E doubled	4			
(c) Momentum doubled	(b)	PE doubled		
	(d)	Acceleration is d	oubled	
24. The value of quantity G in the law of gravitation				
(a) Depends on mass of Earth only				
(b) Depends on radius fo Earth only				
(c) Depends on both				
(d) It independent of mass and radius of Earth				
25. Two forces of $F_1 = 5$ N and $F_2 = 15$ N are wordisplaced by 5 m in direction of net force. What we	rking	on a body in one		
	vill be	he work done bu	Posite	direction. If body
		50 J		
26. When total work done on a particle is positive the	(0)	20.1	(d)	75 J
(a) KE remain constant	(b)	M		
(c) KE decreases		Momentum incre		
27. When brakes are applied to moving vehicle the	(d)	All of these		
27. When brakes are applied to moving vehicle, the w  (a) Positive (b) Negative	OFK de	one by the brakin	g syste	m is:
28. A bullet of mass 10 g leaves a miss.	(c)	Zero	(d)	None of these
28. A bullet of mass 10 g leaves a riffle at an initial velevel with a velocity of 500 m/s, the work in overce	elocity	of 1000 m/s and	strikes	earth at the same
(a) 500 f		rue resistance of a	air will	De:
29. If a body is moving and the state of the	(c)	3750 J	(d)	475 J
29. If a body is moving under the action of constant for done on the body is	orce as	shown in the figu	re bel	ow then the work
F F		Gam Statement	2	on then the work
	d			
an (a) Positive	Depart	named of the party of		
(a) Positive (b) negative (a) force is zero (c) force and the control of the cont	(0)	arthur messes has	1000	A MARKET SE
(a) c man pushing the rigid well is	(c)	maximum	(d)	Minimum
(c) c	o beca	use		
and displacement	spine	ment is zero		
, d) to	orce an	d displacement are	perpen	dicular
(a) Police (a)				
9				
Sr. 17. 18. 19. 20. 21 22 2	3 24	25. 26. 27. 28	29.	30.
Anes	-	The same of the sa		200
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WORK AND ENERGY

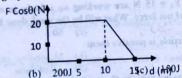
(d) Varies

31. If a car is moving with uniform veloci	ity then work done on the car by	Engine ,Friction and ne
force is respectively		

- (a) positive, negative, positive
- (b) positive, negative, negative
- (c) positive, negative, zero
- (d) positive, zero, positive
- 32. If a force  $\vec{F} = 4\vec{i} + 6\vec{j}$  displaces the body from point p(2,3) to a point Q(5,-2) then what is work done.
  - (a) 9J
- (b) -9 J (c) 18 J
- 33. The graph between displacement and component of force in the direction of displacement for a body is shown in the figure below. Work done on the body is



- (a) 20J
- (b) 30 J
- (c) 40 J
- 34. Force, displacement graph for a body is shown in the figure below. Work done on the body is (c) 750J (b) 15J
- (a) 7.5J 35. Force - displacement graph for a body is shown in the figure below. Work done on the body is



- 36. A person holding a 10kg bag covers a displacement 5m in horizontal direction. How much work is done by gravity
  - (c) -500J
- 37. Two balls of different masses rolls down from a frictionless plane as shown in the figure below
  - then which balls is moving faster
    - (a) Bigger ball

- Smaller ball
- (d) Depend up on path length
- 38. Two balls of different masses rolls down from a rough plane as shown in the figure below then
  - which balls is moving faster
    - (a) Bigger ball

- Smaller ball
- Both are moving with same speed
- (d) Depend up on path length

				Total State	1729210	1000	200	38
Sr.	31	32.	33.	34.	35.	30.	-	
Legarit Market	Garage A	Serger (S.)			4	d	c	a
Ans:	C	d	a	a	u	-		

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40. Work has same dimensions as that of: (b) Power (a) Torque (c) Momentum (d) Force (c) 490 J 42. Area under force-displacement graph gives: (d) 0.49 I (a) Velocity (b) Power (c) Work done (d) Acceleration 43. Scalar product of force and velocity is: (a) Work (b) Power (c) Energy (d) Acceleration 44. A body of mass 2kg moving with velocity of 4ms-1 has K.E equal to: (a) 16J (b) 8J (c) 32J (d) 2J 45 All the food we eat in one day has about the same energy as: (a) One liter of petrol 1 liter of petrol (c) 1 liter of petrol 1 liter of petrol 46. The ratio of dimensions of K.E and power is: (b) [T]:1 (c) 1:[T] (d) [M]:[T] 47. A stone of mass 2 kg is dropped from the top of a tower of height 40m. What will be its K.E 10m below the top. (a) 19.6J (b) 1960J (c) 600J (d) 196J 48. A body has P.E = mgh, when it is at height "h" from the ground. At the point the distance "x" below from the top its P.E will be: (a) mgx (c) mg(x+h)(d) mg(h-x)49. If momentum of the body is halved its kinetic energy will be become: (a) Doubled (b) Half (c) Four times (d) One fourth 50. If a body is falling through a height 10m then its velocity at the ground will be:

(c) Infinity

**WORK AND ENERGY** 

(b) Maximum

CONTRACTOR OF THE PARTY OF THE	-	The said and	POST AND								
Sr. 39.	40.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
Sr. 39. Ans: b	a	a	c	b	a	c	b	d	d	d	b

(c) 20m/s

(b) 14m/s

(a) 10m/s

(a) Minimum

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(d) 25m/s

UNIT 03  $\rangle\rangle$ 

# **ROTATIONAL AND CIRCULAR MOTION**

# PRACTICE TEST NO. 1

1.	Determine the	ngula	r vel	ocity	if 4.	8 rev	voluti	ions a	re co	mpl	eted in	4 sec	onds			
	(a) 9.6 rad	ian/sec		(b)	7.5	radi	ans/s	ec	(c)	8	radians	sec	((	d) (	.96 rac	dians/sec
2.	When a body n	oves i	n a c	ircle	of r	adius	rwi	th an	gula	rspe	ed ω,	its cer	itripet	al ac	celerat	ion is
	(a) or			(b)	ω	r			(c)	ω	r		1 2 (	d) (	v/r	
3	A wheel whose	radiu	s is s	50 cr	n rot	tates	at ar	ang	ular	velo	city of	6 rad	/sec. 7	The li	near v	elocity of
٥.	the rim of the v	vheel i	s clo	sest t	to:			0000				1 500				orally of
	(a) 15 m/s			(b)	4.	5 m/s			(c)		.0 m/s				7.5 m/s	
4.	Which of the fo	llowin	g ty	pes o	f for	ce ca	n do	no w	ork o	n th	e parti	icle u	pon wl	nich i	t acts:	
	(a) Friction	nal For	ce	Tex					(b)	) (	iravitat	ional 1	force			
	(c) Centrir	etal fo	rce						(d)		lastic f					
5.	A point on a v	vheel l	has a	cor	stan	t ang	gular	velo	city (	of 3	rad/s.	The a	angle 1	turne	d thro	ugh in 15
	seconds is:															
	(a) 45 rad			(b)		mrac					0πrad		100	(d)	5 rad	
6.	Angle between	radius	s vec	tor a	and c	entri	ipeta	acce	lerat	ion	is			54.65		
	(a) 0°			(b)	) π				(c	) 2	π			(d)	None	of these
7.	The angular di	splace	men	t is a	ssign	ned p	ositi	ve sig	n wh	en t	he rota	tion i	S			
	(a) Clocky	vise							(b	) 1	Anti-cic	OCKWIS	se			
	(c) Perpen	dicula	r								Parallel					
8.	The minute be	nd of	lan	ge cl	ock i	s 3.0	m lo	ng. V	Vhat	is its	mean	angu	lar sp	eed?		
	(a) 1.4 ×	$10^{-4} r$	ad s	-1				89-283	(b	)	$1.0 \times 1$	Urr	aa s	10.000		SHE V HAT
	(c) 52 x	10-3 r	ad s	-1					(d	) 1	$1.7 \times 1$	$0^{-3} r$	ad s			
9.	What is 30 deg	rees in	rad	ians	?								entr gr	HIL	E YOU	
	(a) $\pi/3$			(b)	) π	/6			(0	) 1	τ/2			(d)	$\pi/4$	
10.	Angular displa	cemen	t is	a												
	(a) Vector	quant	ity						(t		Scalar					
	(c) Neithe	recala	r nor	vect	tor q	uanti	ly		(0	)	None o	f these	e			
11.	An arc of lengt	h equa	al to	the	circu	mfei	rence	of a	circl	e sul	otends	an an	gle?	(4)	4π ra	dian
	(a) Tradis	n		(b)	) T	/2 ra	dian		(0	)	ZIT rau	ian	125	(d)	4/1 10	uia
12.	Which is the fo	llowin	g is	not a	uni	t of a	angul	ar di	splac	eme	nt:			11)	Radia	n
-	(a) Degree			(b)	) N	1eter:	S		(	:)	Revolu	tion		(d)	Naula	
13.	One radian me	ans									Sales	I SA		adine	ie unit	v
	(a) Arc lea	ngth of	unit	radi	us is	half					Arc ler	igth of	unit	adius	15 0111	
	(c) One de	egree							(	(t	All of	these				
14.	When an object	t mov	es or	n a ci	ircul	ar pa	ath, t	hen:								
	(a) Its disn	laceme	nt is	cons	stant.											
	(b) Ite dien	laceme	nt ch	nange	es du	e to	chang	e in	distar	ice						
	(c) Its disp	laceme	nt ch	nange	es du	e to	chang	e in	direct	ion	of moti	on				
	(d) Its disp	laceme	nt is	alwa	ys z	ero										
	(a) to disp															1
				-	To division in		CALL	La Contra	BUSINE.	2 V31	10.	11.	12.	13.	14.	
	Sr.	1.	2.	3.	4.	5.	6.	7.	8.	9.	The state of the s		b	b	C	
	Ange	b	h	C	C	a	c	b	d	b	a	C	0	_	_	-004

what force provides the centripetal force to planets moving around the sun?  (a) Coulomb force (b) Gravitational force (c) Magnetic force (d) None of these (e) Magnetic force (e) Magnetic force (d) None of these (e) Magnetic force (a) 0.01745m (b) Im (c) 2m (d) None (d) None (d) None (a) 0.01745m (a) 0.01745m (b) Im (c) 2m (d) None (d) Normal for (e) 2m rad (e) 2 $\pi$ rad (d) $\frac{\pi}{3}$ rad (e) $2\pi$ rad (f) $\pi$ rad (e) $2\pi$ rad (f) $\pi$ rad (g) $2\pi$ rad (h) $\pi$ rad (h) $\pi$ rad (e) $\pi$ rad (f) $\pi$ rad (g) $\pi$ rad (h)	
(c) Magnetic force (c) Magnetic force (c) Magnetic force (d) None of these (d) None of these (e) Immand $\theta=1^{\circ}$ then what is the value of S (a) 0.01745m (b) Im (c) 2m (d) None of these (e) (a) 0.01745m (b) Im (c) 2m (d) None of these (e) Galled (a) Bending force (b) Centripetal force (c) Centrifugal force (d) Normal for the angular displacement of an object after one complete revolution is:  (a) Zero (b) $\pi$ rad (c) $2\pi$ rad (d) $\frac{\pi}{3}$ rad Angular velocity of hour-hand of a mechanical watch is:  (a) Zero/day (b) $\pi$ rad/oh (c) $1 \text{ rev}/12\text{h}$ (d) All Aparticle moves in a circle of radius 25cm at two revolutions per second. The accelerate particle in m/s is:  (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripetal force (a) 1000N (b) 1200N (c) 750N (d) 250N (d) 250N (d) 250N (e) 750N (d) 250N (d) 250N (e) 750N	usho
(a) Maginet sheen what is the value of S (a) 0.01745m (b) Im (c) 2m (d) None A force which acts on an object moving in a circle and is directed towards the center of the galled (a) Bending force (b) Centripetal force (c) Centrifugal force (d) Normal for The angular displacement of an object after one complete revolution is:  (a) Zero (b) $\pi$ rad (c) $2\pi$ rad (d) $\frac{\pi}{3}$ rad Angular velocity of hour-hand of a mechanical watch is:  (a) $2\pi$ red (d) $\pi$ rad/6h (c) $1\pi$ rev/12h (d) All Aparticle moves in a circle of radius 25cm at two revolutions per second. The accelerate particle in m/s is:  (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripetal force (a) 1000N (b) 1200N (c) 750N (d) 250N The magnitude of centripetal force acting on a body of mass mexecuting uniform motion circle of radius r with speed v is:  (a) $v/r^2$ (b) $mv^2/r$ (c) $v/r$ (d) Mvr Angular displacement covered by minute hand in 20 minutes is:  (a) $w/r^2$ (b) $\pi/3$ rad (c) $\pi/6$ rad (d) $2\pi/3$ rad A body moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $\pi/2$ rad (b) $\pi/3$ rad (c) $\pi/6$ rad (d) $2\pi/3$ rad (a) $\pi/2$ rad (b) $\pi/3$ rad (c) $\pi/6$ rad (d) $2\pi/3$ rad (a) Unchanged (b) Halved (c) Doubled (d) Quadrupled Combodies of mass 10kg and 5 kg moving in concentric orbits of radii R and r such that centripetal force to keep the same speed should be:  (a) Unchanged (b) Halved (c) Doubled (d) Quadrupled (a) Price of radius and the centripetal acceleration is:  (a) $R/r$ (b) $r^2/r^2$ (c) $r/R$ (d) $R^2/r^2$ (d) $R^2/r^2$ (d) $R^2/r^2$ (e) $R^2/r^2$ (f) $R^2/r^2$	
If $r = 1m$ and $\theta = 1^{\circ}$ then what is the value of S (a) 0.01745m (b) Im (c) 2m (d) None A force which acts on an object moving in a circle and is directed towards the center of the is called (a) Bending force (b) Centripteal force (c) Centrifugal force (d) Normal for The angular displacement of an object after one complete revolution is: (a) Zero (b) $\pi$ rad (c) $2\pi$ rad (d) $\frac{\pi}{3}$ rad Angular velocity of hour-hand of a mechanical watch is: (a) $2\pi$ revolving is a circle of radius 25cm at two revolutions per second. The acceleration particle in $m/s^3$ is: (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripteal force (a) 1000N (b) 1200N (c) 750N (d) 250N The magnitude of centripteal force acting on a body of mass m executing uniform motion circle of radius $r$ with speed $v$ is: (a) $v/r^2$ (b) $m/r^2$ (c) $v/r$ (d) $m/r^2$ Angular displacement covered by minute hand in 20 minutes is: (a) $v/r^2$ (b) $m/r^2$ (c) $m/r^2$ (c) $m/r^2$ (d) $m/r^2$ A body moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $m/r^2$ rad (b) $m/r^2$ rad (c) $m/r^2$ for ad (d) $m/r^2$ rad (e) $m/r^2$ rad (f) $m/r^2$ rad (g) $m/r^2$ rad (	
Angular velocity of hour-hand of a mechanical watch is:  (a) $2 \text{ero}$ (b) $\pi$ rad  (c) $2\pi$ rad  (d) Normal for the angular displacement of an object after one complete revolution is:  (a) $2 \text{ero}$ (b) $\pi$ rad  (c) $2\pi$ rad  (d) $\frac{\pi}{3}$ rad  Angular velocity of hour-hand of a mechanical watch is:  (a) $2 \text{ero}$ (b) $\pi$ rad/6h  (c) $1 \text{ rev}/12 \text{h}$ (d) All Aparticle moves in a circle of radius 25cm at two revolutions per second. The accelerate particle in $m/s^2$ is:  (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripetal force (a) 1000N  (b) 1200N  (c) 750N  (d) 250N  The magnitude of centripetal force acting on a body of mass mexecuting uniform motion circle of radius r with speed v is:  (a) $\sqrt{r^2}$ (b) $m^2/r$ (c) $\sqrt{r}$ (d) $\sqrt{r}$ Angular displacement covered by minute hand in 20 minutes is:  (a) $\sqrt{r^2}$ (b) $m^2/r$ (c) $\sqrt{r}$ (d) $\sqrt{r}$ rad (d) $\sqrt{r}$ rad Abody moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $R\omega$ (b) $Z$ cro (c) $R\omega^2$ (d) $\frac{\omega^2}{R}$ Aparticle is moving in a circle of radius R with constant speed v. If radius is double the centripetal force to keep the same speed should be:  (a) Unchanged  (b) Halved  (c) Doubled  (d) Quadrupled velocity on a circle of radiu R and r such that periods are same. Then the ratio between their centripetal acceleration is:  (a) $Rr$ (b) $r^2/r^2$ (c) $r/R$ (d) $R^2/r^2$ leaves turns around a curve at 10Km/h. If he turns at double the speed, the tendem verturn is:  (a) $Rr$ (b) $R^2/r^2$ (c) $R^2/r^2$ (d) $R^2/r^2$ (e) $R^2/r^2$ (f) $R^2/r^2$ (f) $R^2/r^2$ (g) $R^2/r$	
A force which acts on an object moving in a circle and is directed towards the center of the is called (a) Bending force (b) Centriptetal force (c) Centrifugal force (d) Normal for The angular displacement of an object after one complete revolution is:  (a) Zero (b) $\pi$ rad (c) $2\pi$ rad (d) $\frac{\pi}{3}$ rad Angular velocity of hour-hand of a mechanical watch is:  (a) Zero/day (b) $\pi$ rad/oh (c) $1\pi$ velocity 12h (d) All Aparticle moves in a circle of radius 25cm at two revolutions per second. The accelerate particle in $m/s^2$ is:  (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripetal force (a) $1000\text{N}$ (b) $1200\text{N}$ (c) $750\text{N}$ (d) $250\text{N}$ The magnitude of centripetal force acting on a body of mass m executing uniform motion circle of radius r with speed v is:  (a) $\pi/r^2$ (c) $\pi/r^2$ (c) $\pi/r^2$ (d) $\pi/r^2$ Angular displacement covered by minute hand in 20 minutes is:  (a) $\pi/r^2$ (d) $\pi/r^2$ Abody moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $\pi/r^2$ (b) $\pi/r^2$ and (b) $\pi/r^2$ and (c) $\pi/r^2$ and (d) $\pi/r^2$ Abody moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $\pi/r^2$ (c) $\pi/r^2$ (c) $\pi/r^2$ (d) $\pi/r^2$ (e) $\pi/r^2$ (e) Doubled (d) Quadrupled (e) Unchanged (b) Halved (c) Doubled (d) Quadrupled (e) Unchanged (f) Halved (f) Doubled (f) Quadrupled (g) $\pi/r^2$ (g)	
(a) Bending force (b) Centripetal force (c) Centrifugal force (d) Normal for The angular displacement of an object after one complete revolution is:  (a) Zero (b) $\pi$ rad (c) $2\pi$ rad (d) $\frac{\pi}{3}$ rad Angular velocity of hour-hand of a mechanical watch is:  (a) $2\pi$ velocity of hour-hand of a mechanical watch is:  (a) $2\pi$ velocity of hour-hand of a mechanical watch is:  (a) $2\pi$ velocity of hour-hand of a mechanical watch is:  (a) $2\pi$ velocity of a circle of radius 25cm at two revolutions per second. The accelerate particle in $m/s^2$ is:  (a) $2\pi^2$ (b) $4\pi^2$ (c) $8\pi^2$ (d) $\pi^2$ A 500kg car takes a round turn of radius 50m with a velocity 36 km/h. The centripetal force (a) 1000N (b) 1200N (c) 750N (d) 250N  The magnitude of centripetal force acting on a body of mass m executing uniform motion circle of radius $\pi$ with speed $\pi$ via:  (a) $\pi/r^2$ (b) $\pi/r^2$ (c) $\pi/r^2$ (d) $\pi/r^2$ Angular displacement covered by minute hand in 20 minutes is:  (a) $\pi/r^2$ rad (b) $\pi/r^2$ rad (c) $\pi/r^2$ rad (d) $\pi/r^2$ rad A body moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $\pi/r^2$ rad (b) $\pi/r^2$ rad (c) $\pi/r^2$ rad (d) $\pi/r^2$ rad A body moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) $\pi/r^2$ rad (b) $\pi/r^2$ rad (c) $\pi/r^2$ rad (d) $\pi/r^2$ rad (e) $\pi/r^2$ rad (e) $\pi/r^2$ rad (f) $\pi/r^2$ rad (f) $\pi/r^2$ rad (f) $\pi/r^2$ rad (g) $\pi/r^2$ rad rad rotated in a circle with a constant speed (e) $\pi/r^2$ rad/sec (f) $\pi/r^2$ rad/sec (g) $\pi/r^2$	
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The magnitude of centripetal force acting on a body of mass m executing uniform motion circle of radius r with speed v is:  (a) v/r (b) mv²/r (c) v/rm (d) Mvr  Angular displacement covered by minute hand in 20 minutes is:  (a) π/2 rad (b) π/3 rad (c) π/6 rad (d) 2π/3 rad  A body moves with constant angular velocity on a circle. Magnitude of angular acceleration (a) Rω (b) Zero (c) Rω² (d) ω²/R  A particle is moving in a circle of radius R with constant speed v. If radius is double the centripetal force to keep the same speed should be:  (a) Unchanged (b) Halved (c) Doubled (d) Quadrupled (a) Unchanged (b) Halved (c) Doubled (d) Quadrupled periods are same. Then the ratio between their centripetal acceleration is:  (a) R/r (b) r²/r² (c) r/R (d) R²/r²  The ratio of angular speeds of minute hand and hour hand of watch is:  (a) 12:1 (b) 6:1 (c) 1:6 (d) 1:12  A cyclist turns around a curve at 10Km/h. If he turns at double the speed, the tendent of mass m is tied to a string of length L and rotated in a circle with a constant speed he string is released, the stone flies:  (a) With an acceleration mv²/L (b) Tangentially outward (d) Radially inward (e) Radially outward (d) Radially inward (d) Radially inward (e) Radially outward (d) Radially inward (e) Radially outward (f) Along the tangent (f) Along the circumference of the circle (d) Along the radius	
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the string is released, the stone flies:  (a) With an acceleration $\frac{mv^2}{L}$ (b) Tangentially outward  (c) Radially outward  (d) Radially inward  (e) Radially outward  (fine angular speed of a fly wheel making 120 revolutions/minute in radian per second is:  (a) $\pi$ rad/sec  (b) $2\pi$ rad/sec  (c) $4\pi$ rad/sec  (d) $4\pi^2$ rad/sec  (e) $4\pi$ rad/sec  (f) Along the circumference of the circle  (g) Along the radius	
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With an acceleration $\frac{mv^2}{L}$ (b) Tangentially outward  (c) Radially outward  (d) Radially inward  (a) $\pi$ rad/sec (b) $2\pi$ rad/sec (c) $4\pi$ rad/sec (d) $4\pi^2$ rad/sec  (a) Zero (b) Along the circumference of the circle (d) Along the radius	v. I
(c) Radially outward  (d) Radially inward  (he angular speed of a fly wheel making 120 revolutions/minute in radian per second is:  (a) $\pi$ rad/sec  (b) $2\pi$ rad/sec  (c) $4\pi$ rad/sec  (d) $4\pi^2$ rad/sec  (e) $4\pi$ rad/sec  (f) $4\pi$ rad/sec  (g) Along the circumference of the circle  (g) Along the radius	
(a) $\pi$ rad/sec (b) $2\pi$ rad/sec (c) $4\pi$ rad/sec (d) $4\pi^2$ rad/sec (a) Zero (e) Along the circumference of the circle (d) Along the radius	
(a) Zero (b) Along the circumference of the circle (d) Along the radius (d) Along the radius	
(a) Zero (b) Along the circumference of the circle (d) Along the radius (d) Along the radius	
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Ans: b 10.	17. 18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.
a PRIOR	b c	d	b	a	b	d	b	b	a	a	b	b	c	. d
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(a) Changes in direction

(b) Changes in magnitude

(c) Changes both in magnitude and direction

(d) Remains constant

33. The force required to move a body of mass 1kg with velocity 10m/s along circular path of radius 0.1m:

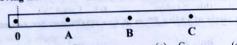
(b) 1N

(c) 1000N

34. A body moves from one end of diameter to other end. If radius of circle is 1m then its angular displacement will be: (b)  $\frac{\pi}{2}$  rad (c)  $\pi$  rad

(a)  $\frac{\pi}{1}$  rad

35. If a grid rod pivoted at point O is rotating around its own axis as shown in the figure below, then which point is moving faster



(a) A

(b) B

(c) C

All have same speed

36. If a tyre of radius 0.5m is rolling without slipping then its horizontal covered in 3 revolution is about:

(a) 5.4m

(b) 9.4m

(c) 14.4m

(d) 20m

37. Angular speed of daily rotation of earth is:

(a)  $\pi/24 \text{ rad/h}$ 

(b) π/6 rad/h

(c)  $\pi/2 \text{ rad/h}$ 

(d)  $\pi/12 \text{ rad/h}$ 

38. A body moving along a circular path completes a round trip. The angular displacement is: (c) Zero

(b) 2r (a)  $2\pi$ 

39. A stone tied to the end of 20cm long string is whirled in a horizontal circle. If the centripetal acceleration is 9.8m/sec2, its angular speed in rad/s is:

(b) 22/7

40. If mass, speed and radius of circular path are doubled then required centripetal force will become: (d) Sixteen times

(b) Four times

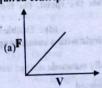
(c) Eight times

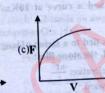
41. A particle is moving in circular path of radius  $1/\pi$  m with time period 2s, then its rate of change (a) Double of velocity will be:

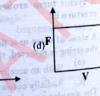
(b)  $2\pi \text{ m/s}^2$ 

(c)  $\pi/2 \text{ m/s}^2$ 

42. A particle of mass m is moving in a circular path of radius r then the graph between speed and required centripetal force is:







43. If angular frequency is doubled, centripetal force is

(b) Four times

(d) Remain same

(c) Eight times (a) Twice 44. The angular velocity will become equal to linear velocity when r becomes (b) Very very small

(a) Zero (c) Unity

(d) Very very large

									Terrance	1 42 43. 44.
Sr.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41. 42. 43. 44. a b b c ZHAR IQBAL 0336-709
Ans:	a	c	c	c	b	d	a	d	b	0336-709
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ROTATIONAL AND CIRCULAR MOTION

45. The frequency of a particle performing circular motion changes from 60 rpm to 180 rpm in 20s then the angular acceleration is

(a)  $0.1\pi/\text{rads}^2$ 

(b)  $12\pi \text{ rad/s}^2$ 

(c)  $3\pi \text{ rad/s}^2$ 

(d)  $40\pi \text{ rad/s}^2$ 

(a) 40π rad/s²

46. A car is moving in a circular track of radius 20m at a constant speed of 20m/sec. Find the centripetal acceleration: (b)  $40 \text{ m/s}^2$ (c)  $30 \text{ m/s}^2$ (d)  $10 \text{ m/s}^2$ 

(a) 20 m/s²

(a) 10 m/s²

47. Circular motion of a particle while attached to a string centripetal acceleration is provided by: (a) Tension in string (b) Gravitational force

(c) Normal force

(d) None of these 48. Determine the angular displacement in radians of 6.5 revolutions:

(a) 40.8 radians

(b) 4 radians

(c) 3 radians

(d) 36 radians

49. Find angular acceleration when  $\Delta\omega$  is 250 rpm and  $\Delta t$  is 5.00 s: (a) 5.24 rad/sec² (b) 6 rad/sec²

(c) 10 rad/sec²

(d) None of these

50. Determine the linear velocity of a point rotating at an angular velocity of  $12 \pi$  radians per second at a distance of 8 centimeters from the center of the rotating object:

(a) 31.6 cm/s

(b) 301.6 cm/s

(c) 30.6 cm/s

(d) 3016 cm/s

Sr.	45.	46.	47.	48.	49.	50.
Ans:	b	a	a	a	a	b

### PRACTICE TEST NO. 2

1. Angular speed of minutes hand of mechanical watch is:

(a)  $\frac{\pi}{30}$  radm⁻¹

(b)  $\frac{\pi}{2} \ rad m^{-1}$ 

(c)  $\frac{\pi}{12} radm^{-1}$ 

(d)  $\pi$  radm⁻¹

2. Two bodies of equal masses are moving on two circular paths of radii in ratio 1:2, with same angular velocity. The ratio of centripetal forces acting on these bodies is:

(a) 4:1 (b) 2:1

3. Two cars of masses of m1 and m2 are moving along the circular path of radius r1 and r2. They take one round in the same time. The ratio of angular velocity of two cars will be: (b)  $m_1r_1:m_2r_2$ (c) 1:1

4. If two bodies having moment of inertia 10kgm2 and 20kgm2. If they are subjected to same

amount of torque then the ratio between their angular acceleration will be:

(b) 2:1 5. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle. The motion takes place in a plane. It follows that:

(a) Its velocity is constant (c) Its K.E is constant

(b) It moves in a circular path

(d) Both B and C 6. The centripetal force required to keep the body in circular path is F1. What would be centripetal force if radius becomes two times keeping same angular velocity:

(b) F₁/4

(c) 4F₁

7. A particle moving in a circular path may have:

(a) Tangential acceleration (c) Radial acceleration

(b) Angular acceleration

8. If a particle of mass m is moving in a circular path of radius r with time period T then the (d) All of these

expression for required centripetal force will be:

 $4\pi^2 mr$ 

 $4\pi^2 mT^2$ 

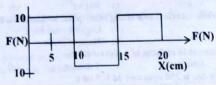
AT PREP BOO

(a) 100J

(d) 50J

9.	A fan is switched off ar	d its completes 20 revolu	tions before coming to	rest, with uniform angula
	acceleration -10rev/s ² t (a) 10π rad/s	hen its initial angular vel (b) 20π rad/s	(c) 30π rad/s	(d) 40π rad/s

10. The figure shows the force distance graph of a body moving along a straight line. The work done



11. If the body is moving in a circle of radius r with constant speed v, its angular velocity:

(c) vr 12. When body moves with a constant speed along a circle:

(b) -100J

(a) Its velocity remains constant

No work is done on it

(c) 200J

No acceleration is produced in the body (c) No force acts on the body

13. A particle is moving in a horizontal circle with constant speed. It has constant:

(c) Acceleration (b) Displacement (d) Velocity (a) K.E 14. A particle moves with constant angular velocity in a circle. During the motion its:

(b) Energy is conserved (a) Momentum is conserved

(d) None of the above is conserved (c) Both momentum and energy are conserved

15. Direction of angular acceleration is always along the direction of:

(c) Force (d) Torque (a) Velocity (b) Displacement

16. A car moving on a horizontal road may be thrown out of the road in taking a turn:

(b) Due to rolling friction force between tyre and (a) Due to the reaction of the ground road

(d) Due to lack of sufficient centripetal force (c) By the gravitational force

17. A body is moving in a circular path with a constant speed. It has:

(b) A constant velocity (a) A constant momentum

(d) An acceleration of constant magnitude (c) A constant acceleration

18. Certain neutron stars are believed to be rotating at about 1rev/sec. If such a start has radius of 20km, the acceleration of an object on the equator of the start will be: (d) 4x108m/sec2

(c) 20x108m/sec2 (b) 8x10⁵m/sec² (a) 120x10⁵m/sec² 19. In uniform circular motion, the velocity vector and acceleration vector are:

(b) Same direction (a) Not related to each other

(c) Opposite direction

(d) Perpendicular to each other

20. If a particle covers half the circle of radius R with constant speed then:

(a) Change in K.E is zero

(b) Change in K.E is my

(d) Momentum change is myr

21. A body of mass 5kg is moving in a circle of radius 1m with angular velocity of 2 radian/ sec. The centripetal force is:

(a) 40N

(b) 20N

(c) 30N

22. The angular speed of seconds needle in a mechanical watch is:

(a)  $\frac{n}{20}$  rads⁻¹

(b)  $\frac{\pi}{10}$  rods⁻¹

(c)  $\pi rads^{-1}$ 

(d)  $2\pi \text{ rads}^{-1}$ 

30			11. 12. 13. 14.						110		Total Sales	21.		
	Sr.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	a
	Ans:	b	a	d	b	a.	b	d	d	d	b	d	a	

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By AZHAR IQBAL 0336-7098

ROTATIONAL AND CIRCULAR MOTION 23. A particle of mass m is executing uniform circular motion on a path of radius r. If p is the A particle of its linear momentum. The radial force acting on the particle is: (c)  $mp^2/r$ (a) p²/rm

24. A particle moves with constant angular velocity in circular path of certain radius and is acted A particle into a certain centripetal force F. If the angular velocity is doubled, keeping radius same, the new force will be: (a) F/2 (d) F2 25. SI unit of angular displacement is: (b) Revolution (a) Degree (c) Radian (d) All of these 26. If a rotating body is moving anti-clockwise, the direction of angular velocity is: (a) Towards the centre (b) Along the linear velocity (c) Away from the center (d) Perpendicular to both radius and linear velocity 27. One rpm is equal to.... rad/sec: (b) 1.5 28. When a body moves in a circle, the angle between its linear velocity and angular velocity is always? (b) 0 (a) 180 (c) 29. The centripetal force is zero when centrifugal force is (a) Minimum (b) Zero (c) Maximum (d) Infinity 30. An angular velocity of 60 revolutions per minute is the same as: (b) 2π rad/s (a)  $\pi rad/s$ (c) 4π rad/s (d) 360° degree s-1 31. 7 Radian is equal to degree approximately: (a) 300 (b) 500 (c) 400 (d) None of these 32. The ratio of angular speed of the minute hand of clock to that of its hour hand is: (a) 3600:1 (b) 24:1 (c) 60:1 33. The dimensions of angular velocity are: (a)  $[LT^{-1}]$ (b) [LT-2] (c) [LT] 34. What is the measure in radians of the angle A = 330°? (a)  $11\pi/3$ (b)  $7\pi/4$ (c)  $7\pi/6$ (d)  $11\pi/6$ 35. A mixture grinder rotates clockwise with constant angular velocity 50 rad/s its angular acceleration will be: (a) Zero (b) Negative (c) Uniform but not zero (d) Positive 36. The angular speed of the wheels of a bicycle is  $8\pi$  radian/sec there period of rotation is: (a) 25 sec (b) 4 sec 37. The units of angular velocity are similar to: (c) 1/4 sec (d) 2 sec (a) Angular displacement (b) Angular acceleration (c) Angular frequency 38. Centrifugal acceleration of a car moving around in a circle of radius 5 m with 10 m/s velocity: 39. A car is moving in a circular track of diameter 100m at a constant speed of 40m/sec. Find the (b)  $10 \text{ m/s}^2$ centripetal acceleration? (a)  $42 \text{ m/s}^2$ 40. A body is moving in a circle of constant speed. Which statement is true? (d)  $30 \text{ m/s}^2$ (a) The resultant force acts towards the centre of the circle Resultant force is zero Resultant force is along the tangent (d) Resultant force remains constant 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40.

(a) at correct rate

(α) π/2	(b) π	(c) 2π			(d) One			
Sr. 1 2 Ans: d d	. 3 d	4 c	<b>5</b>	6 d	7 c	8 a	9 d	10 c
MIDE AT PRI P BOOK	By AZ415	27	² 3	B	AZHA	AR IQBAI	0336-	7098894

10. Maximum velocity and maximum displacement for SHM are numerically equal when time

(c) √6 times faster

(b) 6 times faster

(d) Both transverse and longitudinal

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c b

(c) Frequency does not change wavelength decrease

44.

b

45. 46.

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(d) Frequency does not change wavelength does not change

38. 39. 40. 41. 42. 43.

Ans:

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a

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(d) 50 m/s

(d) Distance

(d) 30 cm

(d) 1.25 cm

(c) 2.5 cm

(c)

Gravitational

potential energy

(a) Restoring force (b) Inertia

Elastic potential

17. Stars are moving away from earth shows:

(a) Increase in wavelength

UNIT 04	OSCILLATIONS & WAVES	zayan Publish
16. When	standing wave is set up on a string fixed at both ends, which of th	e following statemen
AND THE RESERVE OF THE PARTY OF		
(a)	Sum of the number of antinodes and the number of nodes is always even	en white Bright was
(b)	Wavelength = length of string / number of nodes	
(0)	The shape of the string at any instant shows a symmetry about the mid	point of the string
(d)	Frequency = number of nodes x fundamental frequency	

18. A source observer	is of three	travelling tow	(d) ards a stationary of nal frequency. The	Increase in oserver. The velocity of s	frequency of so	und heard by The speed of
source w		(b) v	(c)	3/2 v	(d) 3v	

(b) Decrease in wavelength

19. A string of 7 m length	has a mass of 0.035 kg	. if tension in the string	g is 60.5 N, then speed of a
wave on the string is: (a) 77 m/s	(b) 102 m/s	(c) 110 m/s	(d) 165 m/s

are:				have an ideal to be (4)
- (:	) ML ⁰	(b) MLT ⁰	(c) ML ⁻¹	(d) ML ⁻²
21. At w	hat temperatu	are the speed of sound will b	e double as that is at 1	0°C.
	1112200	(b) 40°C	(c) 1132 K	(d) 1032 K

22	. At constant pro	essure, if the density of air	is reduced to one-fourt	h, the speed of sound wil
	become:		a national or management	re and the training of the Art
	(a) Double	(h) Half	(c) Four times	(d) One fourth

	(a)	1132 C	(0) 40 C				
22	. At con	stant pressu	re, if the density	of air is	reduced	to one-fourth	, the speed of so
	become	:		objected t	कर अंद्रीत दा	makes the causes.	1 381 13 SULDON
	(a)	Double	(b) Half		(c)	Four times	(d) One for
23	. Speed	f sound in a	ny medium is inde	pendent o	f:	0.00	diota valvella (a
med a	(a)	Compressib	ility of medium	होतुक सं देश	(b)	Inertia of the n	
	(c)	Frequency of	of the source	avair oilt3	(d)	None of these	enaterant salt of l
24		y of sound in	air is:	21	1007	H yadh	Charles of ART - No.
to b	(a)	Faster in dry	y air than in moist	air	(b)	Directly propo	rtional to pressure
	(c)	Directly pro	portional to tempe	rature	(d)	Independent o	f pressure of air
25	. If fund	amental freq	uency of closed pi	pe is 50 H	z then fr	equency of 2nd	overtone is:

(a) 100 Hz	(b) 50 Hz	(c) 230 HZ	(d) 150 112
26. If you set up the seventh	harmonic on string	fixed at both ends, how ma	any nodes and anti-nodes
are set up in it:	luvined to	barospert (d)	CD. (10.0)

(a) 8.7	(b) 7,7	(c) 8,9	(a) 9,0
27. In stationary waves a	Il particles between two	nodes pass through the r	nean position:
(a) At different ti	mes with different veloci	ties	THE PARTY OF

	At different times with same velocity
(c)	At the same time with equal velocity
(1)	At al time with different velocities

(0)		
(d)	At the same	time with different velocities

## 28. Beats are the result of:

(a)	Diffraction	
(b)	Destructive interference	

(c) Constructive and destructive interference

(d) Superposition of two waves of slightly different frequencies

•	Sound (a)	Seismi			-	Sonic v			(c)	Ultrase	onic w	aves	(d) Infraso	29.
	Sr.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26:	27, 20.	d
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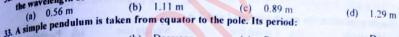
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	By AZHAR IQBAL 03	ALAN CONTRACTOR	8	27	Dariet Ma	19.	***	OOK	REP B	1DCAT	1

UNIT 04  The velocity of sound is v in air. If the	density of air is increased to 4 times at constant pressure,
10. The new velocity	(-) 2

**OSCILLATIONS & WAVES** 





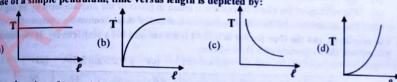


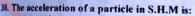
(a) Increase	STREET, SEC. 2	Decrease	(c)	Remains same	(4)	Decrease	then
4. If the length of simple	pendulum (b) 2	is increased	by 300%,	then the time	period will	be increase	ed by:

The period of a simple pendulum	is dot	ibled when:
35. The period of a simple pendulum  (a) Its length is doubled  (b) Its length is made four times	(b)	The mass of bob is doubled
(a) to leasth is made four times	(d)	The mass of the bob and land of

(c) Its length is made four times (d)	The mass of the bob and length of pendulum is doubled
	itude, the ratio of P.E. to the total energy in

36.	When t	He u	THE RESERVE OF THE PARTY OF THE	man primare, the ratio of	i i.E to the total	energy	IS:	
	(a)		(b)	(c)		(d)	1/8	
37.	In case	of a	simple pendulum, tim	e versus length is depic	ted by:	(-)		





(c) Maximum at extreme position  79. The phase difference between its displacement and	(4)	Maximum	onstant n at equilibrium position
(a) $\pi/2$ (b) $\pi$ (D. A particle starts S.H.M from the mean position. Its	1-1	•	(d) $3\pi$

when its	sneed i	half of the maximum position. Its amplitude is A and time period T. At the time
	1000	half of the maximum speed, its displacement y is:
(a)	A/2	The state of the s

41. The maximum smeet	(b) A/V2	(c)	$A\sqrt{3}/2$		(d) 2	A√3	
1.57 ms ⁻² . The time	of a particle executing	SHM i	$s 1 ms^{-1}$	and	maximum	acceleration	is
. The time	period is:						

(a) 4 s	(b) 0.25 s	(c) 0.16 s	(d) $\frac{1}{157}$ s
execution of the follower	owing statement is true	for the speed 22 and the	(d) $\frac{1}{157}$ s

oue of the following and	121
executing simple harmonic and its true for the speed v	and the acceleration a of a nartials
simple harman'	and the acceleration a of a particle
executing simple harmonic motion?	

(a)	Value o	motion.
-	value of a is zero	whatever maybe the value of v
(b)	Wa Zero,	whatever maybe the value of p

When v is zero, a is zero.

(c) When v is maximum, a is zero.

(d) When v is maximum, a is maximum.

When v is maximum, a is maximum.

(a) Two springs have force constants in the ratio 4: 9. Their time periods are in the ratio of:

(b) 3:1

Sr. 30	1				(c)	1.5			(u)			
Ans: a 31.	32. 33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	
PREPROME	d b	a	С	c	В	С	a	c	c	С	a	an.
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44. If the period of oscillation of mass M suspended from a spring is one second, then the period of mass 4M will be

(a) 2 s

(b) 1/2 s

(c) 4 s

45. Time period of oscillation of a spring is 12 s on Earth. What shall be the time period if it is taken

(a) 12 s

(c) 12 × 6 s

(d)  $16 \times \sqrt{12}$ 

46. For a simple pendulum, the graph between l and T is

(a) Hyperbola

(b) Curved line

(c) Straight line

(d) Parabola

47. What is represented by  $\frac{1}{2}mx_0^2\omega^2$ , where the letters have usual meanings?

(a) Maximum K.E. (b) Maximum P.E

(c) Total energy

(d) All of these

48. What is effect on the time period of a simple pendulum if the length is quadrupled?

(a) Halved

(b) Doubled

(c) No effect

(d) It would be zero

49. In simple harmonic motion,

(a) The velocity and displacement of the vibrating particle are in the same phase.

(b) The velocity and acceleration of the vibrating particle are in the same phase.

(c) The velocity of the vibrating particle is ahead in phase of the displacement by an angle of  $\pi$ .

(d) The acceleration of the vibrating particle is ahead of displacement by a phase of  $\pi$ .

50. The amplitude and the time period in S.H.M is 0.5 cm and 0.4 s respectively. If the initial phase is  $\pi/2$  radian, then equation of S.H.M will be:

(a)  $y = 0.5 \sin 5\pi t$  (b)  $y = 0.5 \sin 4\pi t$  (c)  $y = 0.5 \sin 2.5\pi t$  (d)  $y = 0.5 \cos 5\pi t$ 

Sr.	44.	45.	46.	47.	48.	49.	50.
Ans:	a	a	d	d	a	d	d

## PRACTICE TEST NO. 3

1. Given: equation of SHM is x = 10sin(20t + 0.5). The initial phase is:

(a) 0.5 radian

(b) 20 radian

(c) 10 radian

(d) None of these

2. A particle executes SHM. The graph of its velocity as a function of displacement is:

(a) a straight line

(b) a circle

(c) an ellipse

(d) a hyperbola

3. A spring-mass system oscillates with a frequency f. If it is taken in an elevator slowly accelerating upward, the frequency will

(a) Increase

(b) Decrease

(c) Remain same

(d) Become zero

4. A simple harmonic oscillator has a period of 0.01 s and an amplitude of 0.2 m. the magnitude of the velocity in ms-1 at the centre of oscillation is:

(a) 100

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(b) 100 π

(c) 20 m

(d) 40 π

5. The acceleration of a particle in simple harmonic motion is:

(a) Always zero

(b) Always constant

Maximum at the extreme position

(d) Maximum at the equilibrium position

Sr.		2	3	4	5
Ans:	a	c	c	d	C

By AZHAR IQBAL 0336-7098894

UNIT 04

A body executes simple harmonic motion. The potential energy (P.E), the kinetic energy (K.E.)

A body executes simple harmonic motion. The potential energy (P.E), the kinetic energy (K.E.) A body executing (T.E.) are measured as a function of displacement x. Which of the following statements is true? (a) P.E is maximum when x = 0

**OSCILLATIONS & WAVES** 

K.E is maximum when x = 0

(c) T.E is zero when x = 0

(d) K.E is maximum when x = maximum

(d) The maximum acceleration in a SHM is  $\alpha$  and the maximum velocity is  $\beta$ . The amplitude is:

8. A particle executes an undamped SHM of time period T. Then the time period with the potential energy changes is:

(a) T

(b) 2 T

(c) T/2

(d) T/4

9. A system exhibiting S.H.M must possess:

(a) Inertia only

(c) Restoring force, inertia and external force

Restoring force as well as inertia

(d) Restoring force only

10 Velocity at mean position of a particle executing S.H.M is v, they velocity of the particle at a distance equal to half of the amplitude:

11. A particle executes harmonic motion with an angular velocity and maximum acceleration of 2 rad/s and 8 m/s respectively. The amplitude of oscillation is:

(a) 0.1 m

(b) lm

(c) 0.2m

(d) 2m

12. The total energy of the body executing S.H.M is E. Then the K.E when the displacement is half of the amplitude is:

(a) E/2

(b) 3E/4

(c) E/4

(d)  $\sqrt{3}/4$  E

13. What is constant in S.H.M?

(a) Restoring force (b) Potential energy (c) Kinetic energy 14. If the metal bob of simple pendulum is replaced by a wooden bob, then its time period will:

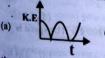
(d) Time period then decrease

(a) Increase (b) Decrease (c) Remain the same (d) 15. The ratio of frequencies of two pendulum are 2:3, then their length are in ratio:

(a)  $\sqrt{2/3}$ 

(b)  $\sqrt{3/2}$ 

16. A body performs S.H.M. Its K.E varies with time t as indicated by graph:









17. If the density of oxygen is 16 times to that of hydrogen, what will be the ratio of their corresponding velocities of sound waves:

18. The type of waves that can be propagated through solid is:

(d) 1:16 (c) 16:1 (d) None of these

19. What is the phase difference between two successive crest in a wave: (b)  $2\pi$ 

(d)  $4\pi$ 

Sr C						(	,					
An. 6. 7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
Sr. 6. 7. Ans: b b	C	b	b	d	b	d	c	d	a	a	b	b
							777		100		- Commence	400

20.	The int	tensity ra	tio of two of two waves is 4:1, terfere with each other is:	hen the ratio of maximu	m and minimum
	when w	vaves inte	erfere with each other is:		intensi
		1.16	(b) 1.0	(-) 0.1	

21. Which of the property makes difference between progressive and stationary waves: (a) Amplitude

(b) Frequency

(c) Propagation of energy

(c) Propagation of energy

22. If number of vibrations of a string are to be increased by factor of two, then tension in the string (a) Half (b) 16 times

(c) Two times

23. A pipe 30 cm long is open at both ends. Which harmonic mode of the pipe is resonantly excited

(a) First

(b) Second

(c) Third

(d) Fourth

24. The Doppler's effect is applicable for:

(a) Light waves

(b) Sound waves

(c) Radio waves

25. When sound wave enter from a rare medium to denser medium then which of the following

(a) Speed increases

(b) Wavelength increases

(c) Frequency increases

(d) All of these

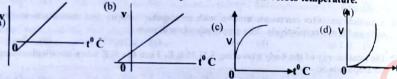
26. With increase in humidity in air the speed of sound in air is:

(a) Increase

(b) Decrease

(c) Remains same

27. Which of the following graph is correct for speed of sound in air verses temperature.



28. If the distance between two consecutive nodes is one fourth of length 'l' of the string then the wavelength of the wave will be:

(b) £/2

(c) 2e

29. A stretched string of length 'l', fixed at both ends can sustain stationary waves of wavelength \( \lambda \). given by:

(a)  $\lambda = n^2/n\ell$  (b)  $\lambda = \ell^2/2n$  (c)  $\lambda = 2\ell/n$  (d)  $\lambda = 2\ell n$ 

30. A source of sound emits wave with frequency f Hz and speed v m/sec. Two observers moves away from this source in opposite direction with a speed of 0.2 v relative to the source. The ratio of frequencies heard by the two observers will be:

(a) 3:2

(b) 2:3

(c) 1:1

(d) 4:10

31. An observer is moving away from source of sound of frequency 200 Hz. His speed is 33 m/s speed of sound is 330 m/s, observed frequency is:

(a) 90 Hz

(b) 180 Hz

92 Hz

(d) 184 Hz

32. Which of the following is not an assumption of the kinetic model of an ideal gas? unit 5

(a) The size of the molecules is much smaller than the separation between molecules. Molecules suffer negligible momentum change during wall collisions

(c) Molecules do not exert force on each other except during a collision

The gas molecules are in random motion and may change their direction of motion after every collision

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		OSCILLATIONS &		Zayan Publisher
04	to between	n two points is 3 $\pi$ . Th	e distance between th	ese points is 15 cm. What is
The p	hase angle between welength of the wa	ive?	Later Day Ith	points is 13 cm. what is
L- 19/9	velength	(h) 45 cm	(c) 5 cm	(1) 10
(a)	30 cm	modium each particl	e of the medium perfo	rms 100 complete vibrations
wav	e passes through	e frequency of the wave		and 100 complete vibrations
n 5 se	conds, white	(b) 20 Hz	(c) 4 Hz	(4) 40 11-
(a)	2 Hz	which of the following	does not depend on the	ne initial displacement of the
in ma	ss-spring system,	Willest of the following	does not depend on the	he initial displacement of the
pring			(b) Average spe	
(a)	Maximum kinet	ic energy of the mass	(d) Angular free	mency of the oscillation
(c)	Total energy of	ine mass	me period is T What	is the distance travelled by a
If the	wavelength of a w	vave is 20 cm and its in	me period is 1. What	is the distance travelled by a
crest (	of the wave in 1.23		(c) 15 cm	(d) 40 cm
			(C) 15 CIII	d of sound in air is 330 m/s
		its a sound of frequen	cy 1800 Hz. The spee	d of sound in air is 330 m/s.
TIL - 0	mbulance moves	towards a stationary of	bserver at a constant	speed of 50 m/s. What is the
Canalli.	ency heard by the	observer?		
(a)	$(1800 \times 290)/3$	30		
(h)	$(1800 \times 330)/2$	80		
(c)	$(1800 \times 330)/3$	70		
	(1000 v 220)/3	80		
A +	neverse wave on a	string has an amplitud	e A. A tiny spot on the	e string is colored red. As one
cycle	of the wave passes	by, what is the total di	stance traveled by the	red spot?
10	) A	(b) 2A	(c) A/2	(d) 4A
Supe	rposition of two w	aves having slightly dif	ferent frequency, sam	e amplitude and travelling in
	ame direction, is ca			
(a	) Interference		(b) Diffraction	
(c	) Beats		(d) Stationary v	
Ina	stationary wave, if	the string is made to v	ibrate in n loops, the f	requency of stationary waves
	p on the string will	be:		
(a	$fn = n \times fl$	(b) $fn = n + fl$	(c) $Fn = fl/n$	(d) $n \times fn = fl$
Wha		f an cycle known as:		
		(b) Cycle	(c) Instantaneo	us (d) Sin wave
A tu	ning fork A produ	ces 4 beats with anothe	r tuning fork B. If the	frequency of tuning fork B is
		ency of tuning fork A is		Visit of Control (A)
		(b) 1280 Hz		(d) 328 Hz

43. What is echo of sound?

When sound reflects back

When sound gets absorbed When sound penetrates into objects

(d) All of them

44. If a longitudinal wave travelling in a densor medium is incident on a rarer medium, it is ..

(a) Reflected without any change in phase

(b) Reflected with phase change of 90 degree

(c) Reflected with phase change of 180 degree (d) Reflected with phase change of 270 degree

45. A sound wave has a wavelength  $\lambda$ . What is the minimum possible distance between two points with phase difference 90 deg?

(a)  $\lambda/4$ (b)  $3\lambda/2$ 

36. 37. 38. 39. d

(d)  $5\lambda/4$ (c) 5\(\lambda/2\) 40. 41.

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#### **OSCILLATIONS & WAVES**

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46.	A	stationary rmed and t	wave is	formed i	in a pipe	which	is open at	t both	ends. I	f two	complete	dollshe
	fo	rmed and t	he wave	length of t	he wave	is 10 cm.	what is t	he leng	th of th	e pipe?	Prete	loops ar

- (a) 15 cm
- (b) 10 cm
- (c) 5 cm
- (d) 20 cm

- 47. Which of the following statements is true?
  - (a) Power is proportional to voltage only
  - (b) Power is proportional to current only
  - (c) Power is neither proportional to voltage nor to the current
  - (d) Power is proportional to both the voltage and current
- 48. A stationary wave is setup on a string which is fixed at both ends. The frequency of the wave is 400 Hz. If the speed of wave is 480 m/s, then what is the length of the string?
  - (a) 1.2 m
- (b) 0.84 m
- (c) 0.60 m
- (d) 0.42 m
- 49. A succession of events which bring the system back to its initial condition is called: (a) Oscillation (b) Vibration (c) Cycle
- (d) Circle 50. A spring having spring constant of 10 N/m2 is stretched to 5 m, what will be the work done:

(a)	250 J	

(b) 50 J

(c) -250J

(d) 125 I

Sr.	46.	47.	48.	49.	50.
Ans:	b	d	c	c	d

### PRACTICE TEST NO. 4

- 1. The wavelength of matter wave is independent of:
  - (a) Mass
- (b) Velocity
- (c) Kinetic energy (d) Charge
- 2. The speed of sound, v, is not affected by a variation in the pressure of the gas, because:
  - (a) Speed, v, does not depend on pressure
  - (b) Speed, v, does not depend on density
- (c) Density is proportional to pressure
  - (d) None of the above
- 3. Speed of the sound, v, in a medium of elastic modulus E and density d, is given by:
- (b)  $v = E \times d$
- (c)  $v^2 = E \times d$  (d)  $v^2 = E/d$
- 4. When path difference between two waves are integral multiple of wavelength, the resultant effect is called:
  - (a) Destructive interference
  - (b) Constructive interference
  - Beats (c)
  - (d) Diffraction
- 5. In case of harmonic oscillator total energy remains
  - (a) Variable
- (b) Infinity (c) Constant (d) Zero
- 6. A park has an outdoor organ. When the air temperature increase, the fundamental frequency of one of the organ pipes:
  - (a) Is impossible to determine
- (b) Remain the same

(c) Decrease

- (d) Increase
- 7. The shortest distance between two points on a travelling wave that have a phase difference of (pi/3) is 5 cm. If the wave has frequency 500 Hz, what is the speed of the wave? (a) 300 m/s (b) 150 m/s (c) 300 cm/s (d) 150 cm/s

- The phase of Therward by shall det

- 8. Radar system is an application of:
  - (a) Doppler's effect

(b) Compton's effect

- (c) Resonance

(d) Wave nature of matter

Sr. 1	2	3	4	5	6	7 8
Ans: d	c	d	b	c	d	b a

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#### **OSCILLATIONS & WAVES**

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- The distance between two consecutive nodes in a stationary wave is equal to:

(a) One wavelength

- (d) Half wavelength
- (c) 3 wavelength 10. When a wave comes across the boundary of two media, a part of it is reflected back. Which statement is true about reflected wave:
  - (a) Its wavelength changes depending on the nature of the boundary
  - Its frequency changes depending on the nature of the boundary
  - Its amplitude increases depending on the nature of the boundary
  - Its phase may changes depending on the nature of the boundary
- 11. A vibrating string have a little sound. However, when attached with a board then sound have a greater intensity. It is because:
  - (a) The string vibrates with more energy
  - (b) The sound is concentrated over smaller area
  - (c) The speed of sound is greater in board

  - (d) The energy leaves the board at a greater rate
- 12. The two points of a medium are separated through a distance of 10cm. What is the phase angle between these two points if the wavelength of the wave is 0.1m.
  - (a) T
- (b) 2π
- (c) 3m
- 13. When a standing wave is set up in a pipe which is open from one end, which of the following statement is true?
  - (a) Sum of the number of antinodes and the number of nodes is always even
  - (b) Wavelength = length string / number of nodes
  - The shape of the string at any instant shows a symmetry about the midpoint of the
  - (d) Frequency = number of nodes × fundamental frequency
- 14. Frequency of a travelling wave is 2000 Hz. Its speed is 300 m/s. What is its wavelength?
  - (a) 20/3 m
- (b)  $20 \times 3 \, \text{m}$
- (c) 3/20 m
  - (d) 2/3 m
- 15. The speed v of the waves in the string depends upon the tension F of the string and m, the mass per unit length of the string. It is given by (a)  $v^2 = F/m$ (b) v = F/m(c) vxm = F(d)  $v = F \times m$
- 16. At what speed should a source of sound move away from the source so that stationary observer
  - (b) 2v
  - finds the apparent frequency equal to half of the original frequency:
- 17. The source is moving away from a stationary observer then the pitch of the sound will:
  - (a) Decrease (b) Increase
- (c) Remains same (d) Cannot be predicted
- 18. Doppler shift in frequencies does not depend upon:
  - (a) The frequency of the wave produced
- (b) The velocity of the source
- (c) The velocity of the observer
- (d) None of the above
- 19. The fundamental frequency of a closed organ pipe is 100 Hz. The frequency of the second overtone is: (a) 100 Hz (b) 200 Hz (c) 300 Hz (d) 500 Hz 20. If two waves having amplitude 2 cm and 3 cm interfere with each other then the ratio between

- maximum and minimum intensities will be: (a) 3:2 (b) 5:1
- 21. Speed of sound at temperature 10°C is about:
- (c) 25:1 (d) 1:25

d

- (a) 332 m/s (b) 338 m/s 22. Speed of sound in air is 332 m/s at temperature:
  - (a) Zero kelvin
- (b) 273 k
- (c) 373 k

(c) 342 m/s

(d) 348 m/s (d) Room temperature

12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. d

(d) T/9

(d) π

23. When frequency of sound is 400 Hz. The speed of sound in air is v. What is speed of sound in air if frequency is 800 Hz:

(c) 2v (a) v (b) v/2

24. With which velocity an observer should move relative to a stationary source so that he hears a

(a) Velocity of sound towards the source

(b) Velocity of sound away from the source

(c) Half the velocity of sound towards the source

(d) Double the velocity of sound towards the source

25. If the velocity of sound in air is 350 m/s. Then the fundamental frequency of an open pipe of

(a) 350 Hz

(b) 175 Hz

(c) 900 Hz

(d) 750 Hz

26. A stretched string of 1m length and mass 5 x10⁻⁴ kg is having tension of 20N. If it is plucked at 25 cm from one end then it will vibrate with frequency:

(a) 100 Hz

(b) 200 Hz

(c) 300 Hz

(d) 400 Hz 27. When two sound waves superpose, beats are produced when they have:

(a) Different amplitudes and phases (b) Different velocities

(c) Different phases

(d) Different frequencies

28. The superposition takes place between two waves of frequency 'f' and amplitude 'a'. The total intensity is directly proportional to:

(a) a

(b) a²

(c)  $\sqrt{a}$  (d)  $1/\sqrt{a}$ 

29. Which of the following is not the transverse wave?

(a) X-rays

(b) γ-rays (c) Visible light

(d) Sound waves

30. An observer moves towards a stationary source of sound, with a velocity one-fifth of the velocity of sound. What is the percentage increase in the apparent frequency:

31. Velocity of sound is maximum in:

(b) 20% (c) Zero (d) 0.5%

(a) Air (b) Vaccum (c) Water 32. To make the frequency double of a spring oscillator, we have to:

(a) Reduce the mass to one fourth (b) Quadruple the mass

(c) Double of mass (d) Half of mass 33. In a second pendulum, mass of bob is 30 gm. If it is replaced by 90 gm mass. Then its time period

(a) 1 s

(d) 3 s

(c) 4s 34. The time period of simple pendulum is 2s. If its length is increased 4 times, then its period

(d) 4 sec

(a) 16s (b) 2s (c) 8s

(a) Parabola

(b) Hyperbola

35. The graph between T.E and displacement of a particle executing SHM is: (c) Straight line

(d) Ellipse

36. The K.E and P.E of a particle executing S.H.M will be equal, when displacement is:

(a)  $x_0/2$ 

(b)  $x_0\sqrt{2}$ 

(c)  $x\sqrt{\sqrt{2}}$ 

(d)  $x_0\sqrt{2}/3$ 

37. A small body of mass 0.10 kg is executing S.H.M of amplitude 1.0 m and period 0.20 s. The maximum force acting on it is:

(a) 98.596 N

(b) 100.2 N

(c) 76.23 N

(d) 985.96 N

38. A particle is executing a motion x=A  $\cos(\omega t - \theta)$ . The maximum velocity of the particle is:

(a)  $A \omega \cos \theta$ 

(b) A ω

(c)  $A \omega \sin \theta$ 

(d) None of these

| 25   | 30  | at. |     |     |     |     |     |     | 61  | 11  |     | La B |     |     | 28             |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|----------------|
| Sr.  | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33. | 34.  | 35. | 36. | 37. 30.        |
| Ans: | a   | a   | a   | b   | d   | b   | d   | b   | d   | a   | b   | d    | С   | c   | 37. 38.<br>a b |

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(d)

**OSCILLATIONS & WAVES** 

40. A loaded spring vibrates with a period T. The spring is divided into nine equal parts and the

42. A particle of mass m oscillates with simple harmonic motion between points  $x_1$  and  $x_2$ , the equilibrium position being O. Its potential energy is plotted. It will be as given below in the

(b) 3 T (c) T/3

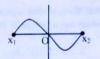
The projection of the particle is executing non-periodic motion The projection of the particle on any of the diameter executes S.H.M

same load is suspended from one of these parts. The new period is:

41. What is the phase difference between velocity and displacement is SHM?







43. A pendulum suspended from the ceiling of a train has a period T when the train is at rest, When the train is accelerating with a uniform acceleration, the period of oscillation will be:

(a) Increases

graph:

(b) decreases

(c) Remain unaffected

the following statement is true:

(d) None of the above

The particle so moving executes S.H.M.

(d) Become infinite

44. A seconds' pendulum is placed in a space laboratory orbiting around the Earth at a height 3R, where R is the radius of the Earth. The time period of the pendulum is:

(a) Infinite

(b) 4 s

(c) Zero

(d)  $2\sqrt{3} s$ .

45. The of equation of SHM of a particle is  $a = 4\pi^2 x$  where a is instantaneous linear acceleration at displacement x. The frequency of motion is:

(a) 1 Hz

(b) 4π Hz

(c)  $\frac{1}{4}$  Hz

(d) 4 Hz

46. A body of mass M is suspended from a spring of force constant K and mass m. The time period of vertical oscillations is

(a)  $2\pi \sqrt{\frac{M}{K}}$  (b)  $2\pi \sqrt{\frac{m}{K}}$  (c)  $2\pi \sqrt{\frac{M+m}{K}}$  (d)  $2\pi \sqrt{\frac{M+m/3}{K}}$ 

| Sr.  | 39. | 40. | 41. | 42. | 43. | 44. | 45. | 46. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: |     | c   | b   | b   | b   | a   | a   | a   |

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47. The length of the seconds' pendulum on the surface of Earth is 1 m. Its length on the surface of Moon, where g is  $\frac{1}{6}th$  the value of g on the surface of Earth, is

(a)  $\frac{1}{6}m$  (b) 6m (c)  $\frac{1}{26}m$ 

48. The length of simple pendulum is increased by 1%. Its time period will be:

(a) Increase by 1% (b) Decrease by 0.5%

(c) Increase by 0.5% (d) Increase by 2%

49. At what temperature velocity of sound is double then that of at 0°C:

(a) 819 K

(b) 819°C

(c) 600°C

50. Two tuning forks have frequencies 450 Hz and 454 Hz respectively. On sounding these forks together, the time interval between successive maximum intensities will be:

(a) 1/4 sec

(b) 1/2 sec

(c) 4 sec

(d) 2 sec

| Sr.  | 47. | 48. | 49. | 50  |
|------|-----|-----|-----|-----|
| Ans: | a   | c   | b   | 30. |

## PRACTICE TEST NO. 5

1. A particle is executing SHM. Which of the following is maximum when the bob is at the mean position?

(a) Time period

(b) Amplitude

(c) Velocity

(d) Acceleration

2. A simple pendulum has a period T. What will be the percentage change in period if the amplitude is decreased by 6%?

(a) 6%

(b) 3%

(c) 1.5%

(d) No change

3. If acceleration due to gravity is halved, then the frequency f of oscillation of a spring becomes:

(b) 4f (c)  $\frac{f}{2}$ 

(d) No effect

4. A uniform spring of force constant k is cut into two pieces, the lengths of which are in the ratio 1 : 2. The ratio of the force constants of the shorter and the longer pieces is:

(a) 1:2 (b) 2:3 (c) 2:1 (d) 1:3

5. The potential energy of a body executing SHM will be maximum at:

(a) Equilibrium position

(b) Extreme position

(c) Both at equilibrium and extreme position

(d) Midway between equilibrium and extreme position

6. The length of a simple pendulum executing simple harmonic motion is increased by 21%. The percentage increase in the time period of the pendulum of increased length is:

(a) 10% (b) 15% (c) 21% (d) 42% 7. The time period of a simple pendulum measured inside a stationary lift is T. If the lift starts moving upward with an acceleration of g/3, what will be its time period?

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### **OSCILLATIONS & WAVES**

8. A simple harmonic oscillator has a period of 0.02 s and an amplitude of 0.05 m. Its velocity at the mean position is: (a)  $2\pi m s^{-1}$ (b)  $3\pi m s^{-1}$  (c)  $4\pi m s^{-1}$ 

9. A S.H.M has amplitude 'a' and time period 'T'. The maximum velocity will be:

(a) 4a/T

(b) 2a/T

(c)  $2\pi \sqrt{a/T}$ 

(d) 2πa/T

10. For a particle executing simple harmonic motion, Which of the following statement is not

Total energy of the particle always remains the same

Restoring force always directed towards the fixed point

(c) Restoring force is maximum at extreme position

(d) Acceleration of particle is maximum at equilibrium position

11. The total energy of a particle executing S.H.M is proportional to:

(a) Displacement from equilibrium position (b) Frequency of oscillation

(c) Velocity in equilibrium position

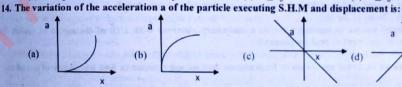
(d) Square of amplitude of motion

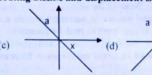
12. A particle is executing simple harmonic motion with frequency f. the frequency at which its K.E. change into P.E is: (a) f/2 (b) F

(c) 2f (d) 4 f

13. Displacement between maximum P.E position and maximum K.E position for a particle executing S.H.M is:

(a)  $-x_0$  (b)  $+x_0$  (c)  $\pm x_0$ 





15. The vertical extension in a light spring by a weight of 1kg suspended from the wire is 9.8 cm. The period oscillation:

(a)  $20 \pi \sec$  (b)  $2 \pi \sec$ 

(c)  $2 \pi/10 \text{ sec}$ 

(d)  $200 \pi \sec$ 

16. The relation between phase difference  $\Delta \emptyset$  and path difference  $\Delta x$  is given as: (a)  $\Delta \Phi = 2\pi (\Delta x)/\lambda$  (b)  $\Delta \Phi = 2\pi \lambda \Delta x$ 

(c)  $\Delta \Phi = 2\pi \lambda / \Delta x$ 

(d)  $\Delta \Phi = 2\Delta x/\lambda$ 

17. If sound wave of frequency f is travelling in air with speed v then sound wave of frequency 4f will travel with speed. (a) v

direction of wave motion of waves is known as:

(b) 4v

(c) 2v

(d) v/4 18. The waves in which the particles of the medium vibrate in a direction perpendicular to the

(a) Transverse wave (c) Propagated wave

(b) Longitudinal wave (d) None of these

19. If the phase difference between the two waves is  $2\pi$  during superposition, then the resultant amplitude is:

(a) Maximum

(c) Maximum or minimum

(b) Minimum

(d) Neither maximum nor minimum

20. An observer is moving away from source of sound of frequency 100 Hz. His speed is 33m/s. If speed of sound is 330 m/s, then the observed frequency is:

| (a) 90   | Hz    |    | (b   | ) 10  | 0 Hz |     | (c  | 91  | Hz   |      | (d   | ) 110 | ) Hz  |        |
|----------|-------|----|------|-------|------|-----|-----|-----|------|------|------|-------|-------|--------|
| Sr.      | 8.    | 9. | 10.  | 11.   | 12.  | 13. | 14. | 15. | 16.  | 17.  | 18.  | 19.   | 20.   |        |
| Ans:     | d     | d  | d    | d     | c    | - c | c   | c   | -    | a    | a    | a     | a     | di     |
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| UNIT 04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| 21. To increase the frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| (a) 4 times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| (a) 4 times  22. A source of sound o m/sec speed. If the sp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| (a) 410 cycles /s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 23. Dimensions of Doppl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| (a) MLT°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 24. Correct value of spec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (a) Newton<br>25. If pressure of air is d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| (a) Double                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 26. Superposition of two (a) Same frequen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (a) Same frequen<br>(b) Same frequen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| (c) Slightly differ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (d) Different freq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| 27. Speed of transverse                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| (a) Tension in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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                                                                                                                                                                        | e inde  | pende  | nt of:            | o dan    |                    |        |                  |         |
| (c) Length of str                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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                                                                                                                                                                        |         | Non    | s per u           | init len | igth of            | string | ,                |         |
| 28. The first overtone in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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                                                                                                                                                                  | (u)     | NOI    | ie of th          | iese     |                    |        |                  |         |
| (a) Same as the f                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| (b) Twice the fur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| (c) Same as that                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (d) None of the a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 29. 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| ratio of apparent to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 30. When an observer r                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (a) $f' = \left(\frac{v + u_o}{v}\right)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| 31. In a stationary wave                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| (a) A quarter of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (c) One wavele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 32. The frequency of ap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | plied A.C                | IS 2 K HZ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | . 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| (a) $0.5 \times 10^{-3}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 33. 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| 34. 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| (a) The speed of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (b) The body me                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        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| (c) The body als                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 35. 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| opposite direction,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (a) Interference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (c) Beats                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| Sr. 21. 22.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2 2                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The Lorentz of the Lo |         | 0.00   | HOUSE.            |          |                    | 22     | 34.              | 35.     |
| DESCRIPTION OF THE PARTY OF THE | 23. 24.                  | 25. 26                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 28.     | 29.    | 30.               | 31.      | 32.                | 33.    | d                | d       |
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | d       | a      | c                 | a        | a                  | b      | 1                |         |
| NMDCAT PREP BOOL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 4                        | THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TW | 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1000    | - 2    |                   |          | YOU.               |        | 336-70           | 98894   |
| THE BOOK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | MARSAN                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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                                                                                                                                                                        |         |        | By A              | ZHAR     | IQBA               | IL (   | 1330-11          | 77-     |

|            |                                                          |            | ose      | CILLA   | ATION                                   | IS & V   | VAVES    | 3      | 185     | -          |         | $Za_{1}$ | an Pu    | blisher     |
|------------|----------------------------------------------------------|------------|----------|---------|-----------------------------------------|----------|----------|--------|---------|------------|---------|----------|----------|-------------|
| INIT 04    | s the wav                                                | elength    | of the   | wave    | if the                                  | phase    | angle    | betwe  | en tw   | o poin     | ts of t | he me    | dium     | is $3\pi/4$ |
| what i     | s the way                                                | arated t   | hrough   | a dis   | stance                                  | of 3 c   | m?       |        |         |            |         |          |          | 010, 4      |
| and the    | s the wave<br>ey are sep<br>8 cm<br>riodic wa<br>Wave le |            | (b)      | 1 cn    | n                                       |          | (c)      | 9 cr   | n       |            | (d)     | 12       | cm       |             |
| (a)        | 8 cm                                                     | ve the d   | istance  | e betw  | veen t                                  | wo cor   | secutiv  | e cre  | sts is  | known      | as      |          |          |             |
| a In a pe  | riodic wa                                                | north.     | (b)      | Am      | plitude                                 | e        | (c)      | Dis    | placer  | nent       | (d)     | No       | ne of t  | hese        |
| (a)        | Wave le<br>ject oscill<br>A restor                       | toe due    | to       |         |                                         |          |          |        |         |            |         |          |          | 1000        |
| . The ob   | ject oscill                                              | ing force  |          |         |                                         |          | (b)      | Its    | weight  |            |         |          |          |             |
| 38. 1 (a)  | A restor                                                 | ing force  |          |         |                                         |          | (d)      | For    | ce of   | friction   |         |          |          |             |
| (0)        | Cenuip                                                   | Ctar ioi   |          | in see  | cond l                                  | harmo    | nic mo   | de, is | estal   | olished    | in a t  | ube t    | hat is   | open a      |
| a A long   | itudinal s                                               | tanding    | the tu   | he is   | 0.80 m                                  | . Wha    | t is the | wave   | elengt  | h of th    | e way   | es the   | t mak    | e un th     |
|            |                                                          | ength of   | the tu   | De is   | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |          |          |        |         |            |         |          |          | c up th     |
| tandi      | ng wave.                                                 |            | 11.3     | 0.41    | 1                                       |          | (-)      | 0.0    | 0       |            | (4)     | 1 1      | 0        |             |
| (a)        | 0.20 m                                                   |            | (0)      | uavall  | ing in                                  | a den    | ser me   | lium   | is ref  | Rected     | from    | the h    | unda     | my of th    |
| 40 When    | ever a tra                                               | nsverse    | wave t   | raven   | ing in                                  | a uciis  | ser me   | muin,  | 13 1 61 | iccicu     | nom     | the b    | Junua    | y of th     |
| rarer      | medium:                                                  | me etchi   | . Par    | .1      | ant va                                  | maine    | como     |        |         |            |         |          |          |             |
| (a)        | The dir                                                  | ection of  | its disp | lacen   | ent re                                  | ravers   | ad       |        |         |            |         |          |          |             |
|            |                                                          |            |          |         |                                         | ieveis   | cu       |        |         |            |         |          |          |             |
| (c)        | The dis                                                  | niacemei   | n uisar  | pears   |                                         |          |          |        |         |            |         |          |          |             |
|            |                                                          |            |          |         |                                         |          |          |        |         |            |         |          |          |             |
| 41 The SI  | need of so                                               | und in w   | ater is  | appro   | oxima                                   | tely:    |          | 226    |         |            |         |          | / .      |             |
|            |                                                          |            |          |         |                                         |          | (c)      | 330    | m/s     |            | (0      | ) 50     | ) m/s    | 1           |
|            | ionary W                                                 | eve is for | med ir   | ı a pip | e whi                                   | ch is o  | pen at   | one e  | nd. II  | lengt      | n of pi | pe is    | L, the   | n what      |
| the m      | aximum p                                                 | ossible v  | vavele   | ngth o  | f the v                                 | wave?    |          |        |         |            |         |          |          |             |
| (0)        | The literal of                                           |            | (b)      | 2 L     |                                         |          | (c)      | 3 L    |         |            | (d      | ) 4      | L        |             |
| 43. The p  | henomen                                                  | on of pol  | arizati  | on of   | light r                                 | eveals   | that li  | ght w  | aves a  | are:       |         |          |          |             |
| (a)        | Transv                                                   | erse wave  | es       |         |                                         |          | (b)      | Lo     | ngitud  | inal wa    | aves    |          |          |             |
| (c)        | Mecha                                                    | nical way  | es       |         |                                         |          |          |        | ne of   |            |         |          |          |             |
| 44. What   | is true at                                               | out acce   | leratio  | n of a  | n obje                                  | ect und  | lergoin  | g sim  | ple h   | armon      | ic mot  | ion?     |          |             |
| (a)        | Accele                                                   | ration is  | minim    | ım wh   | en vel                                  | ocity i  | f maxin  | num    |         |            |         |          |          |             |
| (b         | ) Accele                                                 | ration is  | proport  | tional  | to the                                  | freque   | ncy of o | scilla | tion    |            |         |          |          |             |
| (c         | ) Accele                                                 | ration is  | in oppo  | site d  | irectio                                 | n to its | velocit  | ty     |         |            |         |          |          |             |
| (d         | ) Accele                                                 | ration is  | minim    | ım wh   | en pot                                  | ential   | energy   | is ma  | ximun   | n          |         |          |          |             |
| 45. In sir | nple harn                                                | onic mo    | tion, w  | hich t  | wo qu                                   | antitie  | es are a |        |         |            |         |          |          |             |
| (a         | ) Kinetic                                                | energy a   | and pot  | ential  | energy                                  | y        | (b)      | Kir    | netic e | nergy      | and ve  | locity   |          |             |
| (c         | ) Veloci                                                 | ty and ac  | celerat  | ion     |                                         |          | (d)      | Ac     | celera  | tion an    | d disp  | lacem    | ent      |             |
| 46. A lo   | ngitudinal                                               | standing   | g wave   | e, in s | econd                                   | harm     | onic m   | ode,   | is est  | ablish     | ed in a | a tub    | e open   | at bo       |
| ends.      | The freq                                                 | uency of   | f the s  | tandir  | ig wav                                  | ve is 6  | 60 Hz,   | and    | the s   | peed o     | f sour  | d in     | air is   | 330 m       |
| Wha        | t is the ler                                             | igth of th | e tude   | ?       |                                         |          |          |        |         |            |         |          |          |             |
| (a         | 0.5 m                                                    |            | (h)      | 1 1 n   | n                                       |          | (c)      | 1.5    | m       |            | (d      | ) 2      | m        |             |
| 47. The    | period of                                                | a spring   | oscillat | ting in | SHM                                     | is:      |          |        |         |            |         |          |          |             |
|            | $T = 2\tau$                                              | m          |          |         | Γ                                       | -        |          |        | ,       |            |         |          |          | 2m          |
| (a         | T=2n                                                     | T   11     | (b)      | ) T =   | $= 2\pi$                                | K        | (c)      | T =    | = 2π    | m          | (d      | ) T      | $= 2\pi$ |             |
| 48 I. D    | Sales Sales                                              | VK         |          |         | V                                       | m        |          |        | V       | 2 <i>k</i> |         |          | V        | K           |
| or III B   | A O HALTY                                                | , which q  | uantit   | y is co | nstant                                  | t        |          |        |         |            |         |          |          |             |
| 49. A et   | i) P                                                     |            | (b       | ) T     |                                         |          | (c)      | V      |         |            | (d      | ) R      |          |             |
| node.      | ationary w                                               | vave is se | t up ir  | a pi    | pe of l                                 | ength    | L, whi   | ch is  | pen i   | from b     | oth en  | ds. T    | here a   | re thre     |
|            |                                                          |            | iones a  | n e me  | re in i                                 | ine sta  | COLUMN   | AV 2 V |         |            |         |          |          |             |
| 50. A to   | 2                                                        |            | (b)      | ) 3     |                                         |          | (c)      | 4      |         |            | (d)     | 6        |          |             |
| - 6        | ansverse v  a) Zero                                      | vave is re | flected  | from    | a rigi                                  | d supr   | ort. Th  | ne cha | nge in  | phase      | e on re | flectio  | n will   | be:         |
| Sr.        |                                                          |            | (b       | ) π/2   | 2                                       |          | (c)      | π      | 31      |            | (d)     | $-2\pi$  | 17/2     |             |
| Ans:       | 36. 37                                                   | . 38.      | 39.      | 40.     | 41.                                     | 42.      | 43.      | 44.    | 45.     | 46.        | 47.     | 48.      | 49.      | 50.         |
| 115:       | a                                                        | a          | c        |         |                                         | -        |          | a      | d       | a          | a       | b        | С        | c           |
| WIDO.      | AT PREPE                                                 |            | -        | a       | a                                       | b        | a        | d      | u       | a          | 20.00   | - 0      | 226 76   | 00001       |

51. The distance moved by a particle in simple harmonic motion in one time period is:

(a) A

(b) 2A

(c) 4A

52. A pendulum clock keeping correct time is taken to high altitudes.

(a) It will keep correct time.

(b) Its length should be increased to keep correct time.

(c) Its length should be decreased to keep correct time.

(d) It cannot keep correct time even if the length is changed.

53. The bob of a simple pendulum is kept oscillating by the

(a) Gravitational force

(b) Electrical force (c) Magnetic force (d) Viscous force

54. The time period of a mass suspended from a spring is T. If the spring is cut into four equal parts and the same mass is suspended from one of the parts, then the new time period will be:

55. What fraction of the total energy is kinetic when the displacement is one-half of the amplitude?

56. The length of a seconds' pendulum is approximately:

(a) 994 mm

(b) 99.3 mm

(c) 993 cm

(d) 9.93 m

57. A simple harmonic oscillator has an amplitude 'a' and time period 'T'. The time required by it to travel from x=0 to x=a/2 is:

(a) T/6

(b) T/3

(c) T/4

(d) T/12

58. A particle is performing simple harmonic motion with amplitude A and angular velocity  $\omega$ . The ratio of maximum velocity to maximum acceleration is:

(b) 1/ω

(c) 2ω

59. The amplitude of a particle executing S.H.M with frequency of 60 Hz is 0.01 m. The maximum value of acceleration of the particle is:

(a)  $144\pi^2 \text{ m/s}^2$ 

(d)  $288\pi^2 \text{ m/sec}^2$ 

(b)  $144\pi$  m/s (c)  $144/\pi^2$  m/s² 60. A particle executes S.H.M along a straight line with an amplitude A. The P.E is maximum when the displacement is:

(a) +A

(b)  $\pm A/2$ 

(c) Zero (d)  $\pm A/\sqrt{2}$ 

| Sr.  | 51. | 52. | 53. | 54. | 55. | 56. | 57. | 58. | 59. | 60. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: |     | С   | a   | c   | c   | a   | d   | b   | a   | a   |

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PRACTICE TEST NO. 6

OSCILLATIONS & WAVES

The time period of simple pendulum when it is made to oscillate on the surface of moon:

(a) Increases

(b) Decreases

unchanged

(d) Becomes infinite

A uniform spring of force constant k is cut into two pieces, the lengths of which are in the ratio 1.2. The ratio of the force constants of the shorter and the longer pieces is:

(a) 1:3

(b) 1:2

(c) 2:3

(d) 2:1

(a) 2:1
3. Figure shows transverse wave of frequency 100 Hz travelling in stretched string then speed of the

(a) 5 m/s

(b) 10 m/s

(c) 15 m/s

(d) 20 m/s

4 If the temperature of the atmosphere is increased then which of the following character of the sound wave is affected:

(a) Amplitude

(b) Frequency

(c) Velocity

5. The beats are produced by two sound sources of same amplitude and for nearly equal frequencies. The maximum intensity of beats will be ...... that of one source:

(a) Same

(b) Double

(c) Four times

(d) Eight times

6. A string of length & is fixed at both ends is vibrating in two segments. The wave length of the

corresponding wave is:

(a) 1/4

(b) 2/2

(c) e

(d) 28

7. A closed pipe and an open pipe have their first overtones identical in frequency. Their length are in the ratio:

(a) 1:2

(b) 2:3

(c) 3:4

(c) 10 m/s

(d) 4:5

8. An observer is moving towards the stationary source of sound, then:

(a) Apparent frequency will be less than the real frequency

(b) Apparent frequency will be greater than the real frequency

(c) Apparent frequency will be equal to real frequency

(d) The quality of sound will change

9. A string is attached with a vibrator having frequency 100 Hz. If the distance between two consecutive crest is 2 cm then speed of the wave is: (a) 1 m/s

(b) 2 m/s 10. According to Newton, Modulus of elasticity of air is:

(a)  $1 \times 10^2 \text{ Pa}$ (b)  $1.4 \times 10^5 \text{ Pa}$ 

(c) 1 x 10⁵ Pa

(d) 20 m/s (d) zero

11. With two degree rise in temperature the speed of sound in air increases by:

12. When two tuning forks are sounded together the beat frequency is 3 Hz. If one tuning fork has frequency 480 Hz the frequency of other tuning fork may be: (a) 477 Hz 13. A 16cm string is vibrating in four segments with frequency 100 Hz then the frequency of third

(a) 0.61 m/s

(b) 1.2 m/s

(a) 25 Hz

14. The fundamental note produced by a closed organ pipe is of frequency 'f'. The fundamental note produced by an open organ pipe of same length will be of frequency:

| 1 2         | (0) | •  |    |    | (c) | 21 |     |     | (d) · | 41  |     |
|-------------|-----|----|----|----|-----|----|-----|-----|-------|-----|-----|
| ns: a 4. 3. | 4.  | 5. | 6. | 7. | 8.  | 9. | 10. | 11. | 12.   | 13. | 14. |
| a d d       | c   | С  | c  | С  | b   | b  | c   | b   | d     | Ь   | c   |

15. A source emits a sound of wavelength 30 cm, but the listener observes wavelength 32 cm. Then,

- (a) Listener is moving towards the source
- (b) Listener is moving away from source
- (c) Source is moving towards the listener
- (d) Source is moving away from listener
- 16. When a source moves towards a stationary observer then we use relation to find frequency of

(a)  $f' = \left(\frac{v}{v + u_s}\right)f$  (b)  $f' = \left(\frac{v}{v - u_s}\right)f$  (c)  $f' = \left(\frac{v + u_s}{v}\right)f$  (d)  $f' = \left(\frac{v - u_s}{v}\right)f$ 

- 17. Ten complete waves pass through a point in 2 seconds. If the wavelength is 20 cm, what is the speed of the wave?
- (a) 1 m/s
- (b) 10 cm/s
- (c) 2 m/s
- (d) 40 cm/s
- 18. Which of the following frequency of sound wave is not audible?
  - (a) 5 Hz
- (b) 5000 Hz (c) 2500 Hz
- (d) 50 kHz
- 19. Acceleration in the simple pendulum is always to displacement.
  - Inversely proportional
    - (b) Directly proportional (c) Acting negative (d) Independent
- 20. An object undergoes simple harmonic motion, its amplitude is xo. The speed of the object is v when its displacement is  $x_0/3$ . What is the speed when its displacement is  $x_0$ ?
- (b) 3/2v (c) 2v (d) 0
- 21. Two travelling waves of the same frequency, same amplitude and travelling in same direction result in:
- (b) Standing waves (c) Diffraction (d) Interference 22. Two waves interfere constructively, if the path difference between them must be:
- (a) Beats (a)  $(2n+1)\lambda$
- (b)  $(2n+1)\lambda/2$  (c)  $(2n+1)\lambda/3$
- 23. Which of the following statements about wave motion is true:
- - (a) Waves transport energy and matter
  - (b) Waves transport energy without transporting matter
  - (c) Waves transport matter but not energy
  - (d) None of these
- 24. A pipe is open at both ends. A stationary wave is formed in the air of the pipe. Which statement is true:
  - (a) There is always a central anti node
  - (b) There is always a central node
  - (c) The sum of number of nodes and the number of antinodes is always an even number
- (d) The sum of number of nodes and the number of antinodes is always an odd number 25. When path difference between two waves are odd integral multiple of half the wavelength, the resultant effect is called:
  - (a) Destructive interference

(b) Constructive interference

- (d) Diffraction
- 26. A wave have the speed of 0.50 m/s. If its wavelength is 1.5 m. What is the period of the wave?
  - (a) 0.33s
- (b) 3s
- (c) 1.5s

- 27. In stationary waves
  - (a) Strain is maximum at antinodes
  - (b) Strain is minimum at nodes
  - (c) Strain is maximum at node
  - (d) Amplitude is same at all points
- 15. 16. 17. 19. c d

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- 28. In a travelling wave, five complete waves passes through a points in 10 seconds. Frequency of the
- (a) 0.5 Hz (b) 5 Hz 29. The distance between the consecutive wave fronts is equal to:
- (c) 50 Hz
  - (a) One wavelength

**OSCILLATIONS & WAVES** 

- (b) Two wavelengths (d) Diameter
- (c) Radius
- 30. A stationary wave is set up in a pipe of length L, which is open from one end. There are three nodes. How many antinodes are there in the stationary wave?
  - (b) 3
- (c) 4
- 31. A simple pendulum has mass M, length L and time period T. What is the period of oscillation of the pendulum with mass 4M and length 36L?
  - (a) 6T (b) T
- (c) 2T

(d) 15 Hz

12. A simple pendulum length 'L' with bob of mass 'm' is slightly displaced from its mean nosition so that it string makes an angle ' $\theta$ ' with vertical line as shown in the figure. Then bob of pendulum released. What will be the expression of torque with which the hob starts to move towards the mean position?



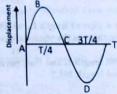
- (a) mgL sin $\theta$
- (c) 0
- (d) mgL  $\cos\theta$
- 33. Ratio of moment of inertia of two objects 'A' and 'B' is 2:3. Which one of the following is the ratio of torques of 'A' And 'B' respectively, if both are being rotated with constant angular acceleration?
  - (a) 3:4
- (b) 3:2
- (c) 2:3
- (d) 4:3
- 34. For interference of light waves to take place, the required condition is
  - (a) The path difference of the light waves from the two source must be large
  - (b) The interfering waves must be non-coherent
  - (c) The light waves may come from different sources
  - (d) The light waves may come from two coherent sources
- 35. The property of bending of light around an obstacle and spreading of light waves into geometric shadow of an obstacle is called:
  - (a) Diffraction
  - (c) Quantization of Light

- (b) Polarization (d) Interference of light
- 36. For constructive interference the path difference is:

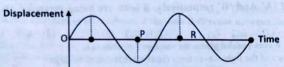
  - (a)  $\left(n + \frac{1}{2}\right)\lambda$  where n = 0, 1, 2, ... (b)  $n\lambda$  where n = 0, 1, 2, ... (c)  $(2n + 1)\lambda$  where n = 0, 1, 2, ... (d)  $\left(\frac{n+1}{2}\right)\lambda$  where n = 0, 1, 2, ...
- 37. A source of sound wave emits waves of frequency 'f'. If 'v' is speed of sound waves, then what will be the wavelength of the waves:
  - (b)  $v-u_0$ 
    - (c) vf
- 38. The spectrum of a star's light is measured and the wavelength of one of the lines as the sodium's line is found to be 589 nm. The same line has the wavelength of 497 nm when observed in the laboratory. This means the star is:\
  - (a) Moving away from the earth (c) Stationary
- (b) Moving towards the north (d) Revolving around the planet

| Sr. 28     | -       |       |     |     |     |     |     |     |     |
|------------|---------|-------|-----|-----|-----|-----|-----|-----|-----|
| Ans:       | 29. 30. | . 31. | 32. | 33. | 34. | 35. | 36. | 37. | 38. |
| MDCAT DD I | a b     | a     | b   | c   | d   | a   | Ь   | a   | a   |

- 39. What is the period of mass spring system during SHM if the ratio of mass to spring constant is
  - (a) π
- (b) 1/π
- (c)  $2\pi$
- (d) ½π
- 40. Waveform of SHM is given in figure. At what time/times displacement is equal to zero?



- (a) T/4 only
- (b) 3T/4 only (c) 0, T/4, 3T/4 and T
- 41. A simple harmonic oscillator has a time period of 1 seconds. Which equation relates its acceleration 'a' and displacement 'x'?
  - (a) a = -2x
- (b)  $a = -(2\pi)x$
- (c)  $a = -\left(\frac{2\pi}{10}\right)^2 x$  (d)  $a = -(2\pi)^2 x$
- 42. When the length of simple pendulum is doubled, find the ratio of the new frequency to the old frequency?
  - (a) 1/4
- (b)  $\sqrt{2}$
- (c) ½
- 43. In the diagram below, the displacement of an oscillating particle is plotted against time, What does the length 'PR' on the time axis represents?



(a) Twice the frequency (c) Half the frequency

- (b) Half the period
- (d) Twice the period
- 44. When the source of sound moves towards the stationary observer, the value of apparent frequency 'fo' is:

- (a)  $f_0 = \left(\frac{v + u_0}{v}\right) f$  (b)  $f_0 = \left(\frac{v}{v + u_s}\right) f$  (c)  $f_0 = \left(\frac{v}{v u_s}\right) f$  (d)  $f_0 = \left(\frac{v u_0}{v}\right) f$ 45. For vibrating mass-spring system, the expression of kinetic energy at any displacement 'x' is
  - (a)  $\frac{1}{2}kx_0^2\left(1-\frac{x^2}{x^2}\right)$

(c)  $\frac{1}{2} m\omega \left(1 - \frac{x^2}{2}\right)$ 

- 46. Speed of sound through a gas in measured as 340 m/s at pressure P1 and temperature T1. What will be the speed of sound if pressure of gas is doubled but temperature is kept constant?
- (b) 340 m/s
- (c) 170 m/s
- (d) 680 m/s
- 47. What should be the length of simple pendulum whose period is 6.28 second at a place where g = 10 ms-2.
  - (a) 0.28 m
- (b) 6.28 m
- (c) 10.8 m
- (d) 10 m
- 48. What should be the ratio of kinetic energy to total energy for simple harmonic oscillator?

| (a) | $1-\frac{x^2}{x_0^2}$ |    | (b) | $(x_0^2 - x^2)$ | (c) |
|-----|-----------------------|----|-----|-----------------|-----|
| 795 | C-                    | 30 | 40  | THE RESERVE     | 40  |

| Sr.  | 39. | 40. | 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | a   | d   | d   | d.  | b   | c   | a   | b   | d   | a   |

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- OSCILLATIONS & WAVES
- 49. In a simple harmonic motion with a radius 'x₀', the velocity of the particle at any point is:
- (a)  $v = \omega \sqrt{x_0^2 x^2}$

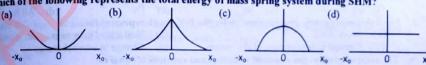
(b)  $v = \omega(x^2 - x_0^2)$ (d)  $v = \omega \sqrt{(x - x_0)}$ 

- (c)  $v = \omega(\sqrt{x_0 x})$
- 50. Frequency of simple pendulum of length 9.6 m will be:
  - (c)  $\pi/2$  Hertz (d)  $\pi/4$  Hertz
- (a) 2π Hertz 51. A body performs simple harmonic motion with a period of 0.063 s. The maximum speed of 3.0 A pour has are the values of the amplitude 'x₀(m)' and angular frequency 'ω (rads⁻¹)'?
  - (a)  $x_0 = 0.03$ ,  $\omega = 100$

- (b)  $x_0 = 0.19, \omega = 16$
- (d)  $x_0 = 3.3$ ,  $\omega = 100$
- (c)  $x_0 = 5.3$ ,  $\omega = 16$ 52. Food being cooked in microwave oven is an example of:
  - (b) Overtones
- (c) Resonance (d) Stationary waves
- (a) Beats 53. Potential energy of a mass spring system with respect to displacement during simple harmonic motion (SHM) is shown in the figure.



Which of the following represents the total energy of mass spring system during SHM?



- 54. Mathematical formula of maximum velocity (vo) for a body executing simple harmonic motion is:
  - (a)  $v_0 = \omega x_0$

(b)  $v_0 = \frac{k}{m} \sqrt{x_0^2 - x^2}$ 

 $v_0 = v \sqrt{1 - \frac{x^2}{x_0^2}}$ 

- (d)  $v_0 = m_0 \sqrt{x_0^2 x^2}$
- 55. An observer moves with velocity 'vo' towards a stationary source, then the number of waves received in one second is:
- (b)  $f = f\left(\frac{v}{v v_o}\right)$  (c)  $f = f\left(\frac{v + v_o}{v}\right)$  (d)  $f = f\left(\frac{v v_o}{v}\right)$

- 56. Resonance occurs when the driving frequency is:
  - (a) Greater than natural frequency
- (b) Unequal the natural frequency
- (c) Less than natural frequency
- (d) Equal to the natural frequency 57. The red shift measurement of Doppler effect of galaxies indicate that the universe is:
  - (a) Expanding (b) Contracting (c) Stationary
- 58. Frequency audible range to human hearing lies in the range: (a) 2-2000 kHz
  - (b) 15-50000 kHz
- (c) 20-20000 kHz
- (d) 20-20000 kHz

(d) Oscillating

| Sr.  | 49. | 50. | 51. | 52. | 53. | 54. | 55. | 56. | 57. | 58. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | a   | b   | a   | c   | d   | a   | c   | d   | a   | c   |

## UNIT $05 \rangle$

# **HEAT AND** THERMODYNAMICS

### PRACTICE TEST NO. 1

1. A gas changes its state from A to B along different path then which of the following relation is true about change in internal energies:



(a)  $\Delta U_1 = \Delta U_2$ 

 $\Delta U_1 > \Delta U_2$ 

2. At room temperature which of the following gas molecules have greater average K.E.

(a) H₂

(b) No

(d) All have same

3. For a thermodynamic process area under the P-V graph represent the:

(a) Work done

(b) Heat added to system

(c) Change in temperature of the system

(d) Change in internal energy

4. The ratio of general gas constant to Boltzmann constant is equal to:

(a)  $8.314 \text{ J mol}^{-1} \text{ K}^{-1}$  (b)  $6.02 \times 1023 \text{ mol}^{-1}$  (c)  $1.38 \times 10-23 \text{ JK}^{-1}$  (d) One

5. P-V diagram for a cyclic process is shown in the figure below, then work done will be:



(a) PV

(b) 4PV

(c) 9PV

(d) Zero

6. 2PV = RT is ideal equation for:

(a) 1 mole

(b) 2 moles

(c) 0.5 moles

(d) 0.25 moles

7. 1st law of thermodynamics is modified form of law of conservation of:

(b) Energy

(d) All of these (c) Momentum

8. According to 1st law of thermodynamics change in internal energy of the system is given as: (a) Q + W(d) Q (b) Q-W (c) W-O

9. If a gas undergoes a cyclic process the its change in internal energy will be zero:

(a) Positive

(b) Negative

(c) Zero

(d) Area of the cycle

10. For which of the following process heat energy is entirely converted into mechanical energy:

(a) Isothermal expansion

(b) Adiabatic expansion

(c) Isothermal compression

(d) Adiabatic compression

11. In which of the following process mechanical energy is entirely converted into internal energy?

(a) Isothermal expansion

(b) Adiabatic expansion

(c) Isothermal compression

| (d) | Adia | batic co | mpressio | n  |
|-----|------|----------|----------|----|
| -   | -    | 10       | 0        | 10 |

| 1 1 2                  | 11. | 10. | 9. | 8. | 7. | 6. | 5. | 4. | 3. | 2. | 1, | Sr.  |
|------------------------|-----|-----|----|----|----|----|----|----|----|----|----|------|
| Ans: a d a c b c b b c | d   | a   | c  | ь  | b  | c  | b  | c  | a  | d  | a  | Ans: |

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HEAT AND THERMODYNAMICS

Zayan Publishe

12. It's kg and 10 kg water are heated then the ratio between their heat capacity will be:

(d) Negative

(c) 1:

13. The ratio of unit of specific heat to unit of heat capacity is:

(d) K-

14. Specific heat of an idea gas for an adiabatic process is:

15. For an ideal gas if  $C_v = \frac{3}{2} R$  then  $C_p = ?$ 

(b) 3R/2

(d) 7R/2

16. For an ideal gas the ratio C,/C, is always:

(a) Equal to one (b) Less than one

Equal or less

Equal or greater

17. A fixed mass of an ideal gas is contained in a cylinder at constant temperature. Now the pressure of the gas is decreased. What happened to the molecules of gas?

Their mean square speed decreases

Number of collision between molecules and walls of container decreased

The force of attraction between them increase

Its internal energy decreases

18 If N is the number of molecules of a gas in a container. Then number of moles can be calculated as:

(a) N+N

(b)  $N_A \times N$ 

(d)  $N - N_A$ 

19. A liquid has mass m and specific heat capacity c. The rate of change in temperature of liquid is R. What is the rate at which heat is transferred from the liquid.

(a) Rmc

(b) R + mc

(c) mc-R

20. Which statement is incorrect?

(a) In a isobaric process  $\Delta P = 0$ 

(b) In a isochoric process  $\Delta W = 0$ 

(c) In a isothermal process  $\Delta T = 0$ 

(d) In a isothermal process  $\Delta Q = 0$ 

21. In adiabatic expansion (a)  $\Delta U = 0$ 

(b)  $\Delta U = \text{negative}$ 22. An ideal reversible heat engine is 100% efficient only if:

(c)  $\Delta U = positive$ 

(b) Hot reservoir is at 0C (d) Cold reservoir is at 0k

(c) Cold reservoir is at 0C 23. An adiabatic change is the one in which:

(a) No heat is added to or taken out of a system

(b) No change of temperature takes place

(c) Boyle's law is applicable

(a) Hot reservoir is at 0K

(d) Pressure and volume remains constant

24. A thermodynamic system undergoes a process in which its internal energy decreases by 300 J. If at the same time 120 J of work is done on the system, find the heat lost by the system.

(b) 80J

25. The efficiency of Carnot engine can never be 1, because: (c) 420J

(a) We cannot achieve the higher temperature (b) We do not have an ideal working substance

There is always energy losses

We need cold reservoir at absolute zero temperature, which is not available

| Sr. 12.<br>Ans: a |     |     |     |     |     |     |     |     |     |     |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans:              | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. |
| 1 8               | a   | c   | b   | a   | d   | b   | d   | a   | a   | d   |

temperature of gas in X:

(b) is double of

(b) 1J

40. During adiabatic expansion internal energy decreases by 2J, then work done in this process is:

(c) -IJ 41. The engine is supposed to work between 727 degree C and 227 degree C, then maximum possible

(c) is half of

(a) is equal to

efficiency is

(a) 1/2

MDCAT PREP BOOF

HEAT AND THERMODYNAMICS When heat is given to isobaric process then: Zayan Publishe (a) Work is done by the gas (b) Internal energy of gas decrease (c) Work is done on the gas (d) Both a and b 43. The efficiency of diesel engine is: (a) 10% to 20% (b) 20% to 35% (c) 35% to 40% (d) 40% to 50% 44. According to 1st law of thermodynamics, when heat is added to a system it appears as: (a) Increase in internal energy Work done by the system Either increase in internal energy or work done by the system (b) (d) Increase in internal energy plus work done by the system 45. For mono atomic ideal gas  $C_v = ?$ (a) 3R/2 (c) 7R/2 46. What does the constant N represent in the equation of state for an ideal gas PV=NkT? (a) Number of molecules of gas (b) Number of moles of the gas (c) Number of nucleons (d) Measuring a voltage 47. An ideal reversible heat engine has: (a) 1 efficiency (b) Highest efficiency (c) An efficiency which depends on the nature substance (d) None of these 48, 100 W heater is used for 5 minutes to heat 500 g of water. What is the change in temperature of water? Specific heat capacity of water is 4.2J/gC. (a) 140C (b) 40C (c) 0.2C (d) 14C 49. Work done in a isobaric process is given by: (a) PdT (b) VdP (d) P²Dv (c) PdV 50. A gas is compressed to half of its initial volume at constant pressure 105 Pa. If its initial volume is 1000 cm3 then work done is:

#### 43. 44 45. 46. 47. 48. 49.

(c) 200J

(d) -50 J

## PRACTICE TEST NO. 2

(b) 100 J

(a) 50J

Ans:

(d) is one fourth of

(d) 1

| 1. | Work    | done by gas              | , pressure and                      | change in v     | olume are i | elated as:         | The sale | A PLANT         |
|----|---------|--------------------------|-------------------------------------|-----------------|-------------|--------------------|----------|-----------------|
|    | (4)     | $W = \frac{\Delta V}{V}$ | (b)                                 | $W = P\Delta V$ | (c)         | $W = P + \Delta V$ | (d)      | W=P-DV          |
| 2. | 177     | Graulent of              | n also be calculated tangent of the | aumia of D 1    | / graph     |                    |          |                 |
|    | (-)     | Area of the              | curve under P                       | -V graph        |             |                    |          |                 |
| 3, |         | of the follo             | tangent of the                      |                 | graph       | ermodynamic        | system?  |                 |
| •  | Which   | of this is co            | onstant in isot                     | P and T         | (c)         | T and V            | (d)      | P and R         |
| 5, | o pecif | lic heat of              | (b)                                 | Work done       | (c)         | Entropy            | (d)      | Internal energy |
|    | (a)     | 13/N.g                   | (b)                                 | 4.18 J/Kg.K     | (c)         | . 4180 J/kgK       | (d)      | 2090 J/kgK      |
|    |         | Sr.                      | 1                                   | 2               | 3           | 4                  | 5        |                 |
|    |         | Ans;                     | b                                   | b               | d           | d                  | c        |                 |
|    |         | PRI P BOC                | I THE SAME                          |                 | 301         | By AZH             | AR IQBA  | L 0336-70988    |

| UNI                                              | T 05                                                                                                          | +                             |                               |              | HEAT    | AND       | THER     | RMODY               | YNAN    | IICS           |          |          | Z        | ayan l   | 0,111        |       |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|--------------|---------|-----------|----------|---------------------|---------|----------------|----------|----------|----------|----------|--------------|-------|
| 6.                                               | A mon:                                                                                                        | atomic<br>t volum             | gas is                        | heate        | d from  | n temp    | eratu    | re T ₁ : | and T   | 12 und         | er two   | differ   | rent c   | onditi   | uou          | shei  |
|                                                  | constan                                                                                                       | t volum                       | e and                         | (ii) con     | nstant  | pressi    | ure. So  | chang               | ge in l | U (inter       | rnal er  | iergy)   | is       | onditte  | ons a        | t (i) |
|                                                  | (a)                                                                                                           | More f                        |                               |              |         |           |          |                     |         | More fo        |          | All Sin  |          |          |              |       |
| -                                                | (c)                                                                                                           | Same f                        | or both                       | h            |         |           |          |                     | (d) 1   | ndeper         | ident o  | f numl   | er of    | moles    |              |       |
| . !                                              | If 1 mo                                                                                                       | Same following Same for their | ideal                         | gas is       | heat    | ed at c   | onsta    | nt volu             | me so   | that           | its ten  | perat    | ure ri   | see ba   | A two        |       |
| 1                                                | first law                                                                                                     | v of the                      | mody                          | namic        | s can   | be wri    | tten a   | s:                  |         |                |          | N to m   |          | ses by   | $\Delta T$ , | ther  |
|                                                  | (a)                                                                                                           | $\Delta U + 0$                | $C_v = \Delta$                | T            |         |           |          |                     |         | $\Delta U = 0$ |          |          |          |          |              |       |
|                                                  | (c)                                                                                                           | $\Delta U = 0$                | $C_v \Delta T$                |              |         |           |          |                     | (d)     | $\Delta H = 0$ | - 1 A    | T        |          |          |              |       |
| . 7                                              | The way                                                                                                       | ves whi                       | ch pro                        | pagat        | e by t  | he osci   | llation  | of ma               | terial  | partic         | les are  | called   |          |          |              |       |
|                                                  | (a)                                                                                                           | Matter                        | waves                         | 3            |         |           |          |                     |         | Mechai         |          |          |          |          |              |       |
|                                                  | (c)                                                                                                           | Ultraso                       | ound w                        | aves         |         |           |          |                     | (d)     | Microv         | vaves    |          |          |          |              |       |
| . A                                              | An idea                                                                                                       | of gas a                      | n mo                          | oles is      | enclo   | sed in    | a con    | tainer              | at a    | constar        | it pres  | sure r   | . The    | Grant.   |              |       |
| 1                                                | volume                                                                                                        | of gas a                      | and its                       | absol        | ute te  | mpera     | ture is  | a stra              | ight li | ine. W         | hat is t | he gra   | dient    | graph    | bety         | veer  |
|                                                  | (a)                                                                                                           | nR                            |                               |              | (b)     | nRP       | الجالا   |                     | (c)     | n              | gos r    | 5.       | (d)      | nP       | grap         | n?    |
|                                                  |                                                                                                               | P                             |                               |              |         |           |          |                     |         | RP             |          |          | , ,      |          |              |       |
| 0. 1                                             | Which o                                                                                                       | of the fo                     | llowi                         | ng abo       | ut Cp   | and C     | v is co  | orrect?             |         |                |          |          |          | R        |              |       |
|                                                  | (a)                                                                                                           | $C_{+} + C$                   | = R                           |              | 115)    | C - D     | -        |                     | 168     | $C_n + R$      | = C.     |          | (d)      | C - D    |              |       |
| 1. \                                             | When a                                                                                                        |                               |                               |              | tant t  | mass 15   | heate    | d in a              | conta   | iner of        | fixed    | volum    | e W      | bot in t | + Cv         |       |
| f                                                | or the i                                                                                                      |                               |                               |              |         |           |          |                     |         |                |          | 3031     | ** 1     | nat is t | ne re        | asoı  |
|                                                  | (a)                                                                                                           | Numbe                         | er of m                       | nolecul      | es per  | unit v    | olume    | increas             | se      |                |          |          |          |          |              |       |
|                                                  | (b)                                                                                                           | Moleci                        | ules oc                       | cupy         | greate  | r volun   | ne of th | ne cont             | ainer   |                |          |          |          |          |              |       |
|                                                  | (c)                                                                                                           | Averag                        | ge forc                       | er per       | impag   | et at the | conta    | iner wa             | all inc | rease          |          |          |          |          |              |       |
|                                                  | (d)                                                                                                           | Molec                         | ules co                       | ollide v     | with ea | ach oth   | er with  | greate              | er fore | e e            |          | gay to   |          |          |              |       |
| 2. 7                                             | The mo                                                                                                        | olar spe                      | cific h                       | neat of      | a di    | atomic    | gas is   | measi               | ured :  | at cons        | tant v   | olume    | and      | found    | to b.        | 20    |
| J                                                | J/mol.k                                                                                                       | . What                        | are th                        | he type      | es of e | energy    | that a   | re con              | tribut  | ing to         | the mo   | lar sp   | ecific   | heat?    | to be        | 29.   |
|                                                  | (a)                                                                                                           | Transl                        | ation o                       | only         |         |           |          |                     | (b)     | Transl         | ation a  | nd rota  | tion o   | nly      |              |       |
|                                                  | (c)                                                                                                           | Transl                        | ation a                       | and vib      | ration  | only      |          |                     | (d)     | Transl         | ation.   | rotation | and      | vibratio | n            |       |
| 3. 7                                             | The sur                                                                                                       | m of all                      | forms                         | of mo        | lecul   | ar ener   | gies (   | kinetic             | and p   | otenti         | al) of   | a subst  | ance     | is term  | ed as        | its   |
|                                                  | (a)                                                                                                           | Absolu                        | ite ten                       | nperati      | ire     |           | 126      |                     | (b)     | Interna        | l ener   | gy       |          | lac      |              |       |
|                                                  | (c)                                                                                                           | Potent                        |                               |              |         |           |          |                     | (d)     | Kineti         | c energ  | ZV       |          |          |              |       |
| 14.                                              | The int                                                                                                       | ernal e                       | iergy                         | chang        | e in s  | ystem t   | hat h    | as abso             | rbed    | 2kcal          | of heat  | and d    | one 5    | 00J of   | work         | is    |
|                                                  | (a)                                                                                                           | 8900 J                        |                               |              | (b)     | 8800.     | 20       |                     | (c)     | 7900 J         |          |          |          | 7500 J   |              |       |
| 15.                                              | Under:                                                                                                        | a cyclic                      | path,                         | intern       | al en   | ergy af   | ter co   | mplete              | cycle   | is sam         | e as     |          |          |          |              |       |
|                                                  | (a)                                                                                                           | 2(initia                      | al)                           |              |         |           |          | A THE T             |         | Initial        |          |          |          |          |              |       |
|                                                  | (c)                                                                                                           | Initial                       | intern                        | al ener      | gy      |           |          |                     | (d)     | Initial        | work     |          |          |          |              |       |
| 16.                                              | An idea                                                                                                       | al gas is                     | comp                          | ressec       | d to h  | alf of i  | ts init  | ial vol             | ume.    | Which          | of the   | ese pro  | cesse    | s would  | l resi       | ılt i |
| -                                                | maxim                                                                                                         | um wor                        | k don                         | e?           |         |           |          |                     |         |                |          |          |          |          |              |       |
|                                                  |                                                                                                               | Adiaba                        |                               |              |         | Isobar    |          |                     |         | Isocho         |          |          |          | Isother  |              |       |
| 17.                                              | Two co                                                                                                        | ntainer                       | s hold                        | an id        | eal ga  | s at the  | e same   | e temp              | eratu   | re and         | pressi   | re. Bo   | oth co   | ntainer  | s hol        | d th  |
|                                                  | same t                                                                                                        | ype of                        | gas, b                        | ut cor       | ntaine  | r B h     | as twi   | ce the              | volu    | me of          | contai   | ner A    | Wha      | t is th  | e ave        | rag   |
|                                                  | transla                                                                                                       | tional k                      | inetic                        | energ        | y per   | moleci    | ule in   | contair             | ner B   | ?              |          |          |          |          |              |       |
|                                                  | (a)                                                                                                           | Twice                         |                               |              |         |           |          |                     | (b)     |                | me as    | that of  | conta    | iner A   |              |       |
|                                                  | (c)                                                                                                           | Half th                       | nat of                        | contair      | ner A   |           |          |                     | (d)     |                |          | deter    |          |          |              |       |
| 18.                                              | In ther                                                                                                       | modyna                        | amics                         | zeroth       | law i   | s relate  | ed wit   | h                   |         | A LOUIS        |          |          |          |          |              |       |
| 18. In thermodynamics zeroth law is related with |                                                                                                               |                               |                               |              |         |           |          |                     |         |                |          |          | (d)      | Entre    | ору          |       |
|                                                  | (a) Work (b) Energy (c) Thermal equilibrium (d) Entropy  19. Which of the following is the adiabatic process: |                               |                               |              |         |           |          |                     |         |                |          |          |          |          |              |       |
|                                                  |                                                                                                               | or the l                      | (a) Conduction (b) Convection |              |         |           |          |                     |         |                |          |          |          |          |              |       |
|                                                  | Which                                                                                                         | Condi                         | iction                        | The state of |         |           |          |                     |         |                |          |          |          |          |              |       |
|                                                  | Which                                                                                                         | Condi                         | action                        |              |         |           |          |                     |         | None           | of thes  | e        |          |          |              |       |
|                                                  | Which (a) (c)                                                                                                 | Condi<br>Radia                | tion                          |              |         |           |          |                     | (d)     | None           | of thes  | e        | and line | The same | 10           | 1     |
|                                                  | Which (a)                                                                                                     | Condi                         | action                        | 8.           | 9.      | 10.       | 11.      | 12.                 |         | None           | of thes  | e 16.    | 17.      | 18.      | 19.          | 1     |
|                                                  | Which (a) (c)                                                                                                 | Condu<br>Radia                | tion                          |              | 9.<br>a | 10.       | 11.<br>c | 12.                 | (d)     | 313            |          |          | 17.      | 18.      | 19.          | ]     |

| HEAT AND THERM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ODYNAM          | MICS                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
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| UNIT US                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | sure does       | a real gas and             | Zayan Publisher                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| and Under when the same and law pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 | a real gas approx          | cimate to an ideal gas?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |
| (a) tomperature and high pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |                            | 8.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |
| tomperature and low pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| to be temperature and high pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (d) High temperature and mgs pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | in all          |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (d) High temperature that the killing of the killing temperature (a) Which of the following is an assumption of the killing (a) Gas is at high pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | metic mo        | del of an ideal ga         | s?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |
| (a) Gas is at high pressure (b) Collision between particles are elastic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (b) Collision between particles are elastic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (c) There are weak forces of attraction between                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | particles       | in gas                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (d) Total energy of particles is proportional to t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | the temper      | rature                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| 22. 100 W heater is used for 5 minutes to heat som                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | e water f       | from 20°C to 50°C          | C? What is the mass of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |
| water which is neared. Specific hear capacity of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | water is 4      | 4.2J/gC.                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (a) 4 g (b) 40 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (c) 2           | 240 g                      | (d) 24 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |
| 23. The value of universal gas, R, constant is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (a) 83141/mol × K                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 | $1.38 \times 10^{-23} J/K$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (c) $6.63 \times 10^{-11} Nm^2/kg^2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (d)             | 1.6 × 10-19 C              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| 24. A gas expands from V1 to V2 at pressure P. Wor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | k done is:      | Patricip of                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (a) $P/(V_2-V_1)$ (b) $(P_2-P_1) V$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | $P(V_1V_2/(V_2-V_1))$      | (d) $P(V_2-V_1)$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |
| 25. Isothermal process can be defined as:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 | the providence and has     | (-7 - (-2 -1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |  |  |  |  |  |
| (a) PV = constant (b) PV = RT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (c) I           | P/V = constant             | (d) $P/V = Nrt$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| 26. One kcal =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 119             |                            | (6) 177 1411                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |
| (a) 4.18J (b) 2.09 J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c) 4           | 1180 J                     | (d) 2090 J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |
| 27. First law of thermodynamics state                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                 |                            | (d) 2090 J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |  |  |  |  |  |
| (a) System can do work                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (b) S           | System has temper          | ratura                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |
| (c) System has pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (d) F           | leat is form of en         | orns/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |
| 28. A monatomic ideal gas is thermally insulate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ed so n         | o heat con flor            | w between it and i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |
| surroundings. Is it possible for the temperature of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | of the gas      | to rise?                   | w between it and i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |
| (a) Yes, The temperature can rise if work is don                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ne by the       | oas .                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (b) No. The only way that the temperature can                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | rise is if h    | eat is added to the        | gas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |  |  |  |  |  |
| (c) Tes. The temperature can rise if work is do                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ne on the       | ess                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| (a) No. The only way that the temperature can                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | rice is hy      | adding more male           | cules in container                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |  |  |  |  |  |
| at the deat engine performs 100 . of work and at the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | he came t       | time rejects 400           | I of heat energy to the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |
| what is the efficiency of the engi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ne?:            |                            | o or hear energy to th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |  |  |  |  |  |
| (a) 20% (b) 25%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1-1 4           | 1%                         | (d) 50%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |  |  |  |  |  |
| 30. An ideal gas of a moles is enclosed in a contain volume of gas and its absolute temperature is a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| and and order temperature is a s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | traight li      | ne. What is the gr         | radient of the grah?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |
| (a) nR/P (b) nRP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (c) n           | /RP                        | (d) np/R                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |
| 31. Which of the following statement is not true about  (a) All real engines are less efficient than Common and Common an | and the parties | gine?                      | (d) hp/K                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | eat losses                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| arnot engine working between                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | en same tu      | vo temperatures d          | lanande on the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |
| nature of working substance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | on same tv      | vo temperatures, o         | icpenus on the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |  |  |  |  |  |
| 32. For an ideal gas P.E of the molecules in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | recervoir       | the meeter is th           | a officionar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |
| 32. For an ideal gas P.E of the molecules is:  (a) Positive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | reservoir       | s, the greater is th       | e efficiency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |  |  |  |  |  |
| 33. Positive (b) Negative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (a) 7           | famo (d)                   | Minimum but not zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |
| For an ideal gas change in interest                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (C) Z           | ero (d)                    | viiiimum out not zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |
| (a) Temperature (b) Pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | cuy prop        | ortional to:               | Change in terminature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |
| (b) Pressure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (c) V           | olume (d)                  | Change in temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |
| Sr. 20 21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                 |                            | WIND TO SERVICE STATE OF THE PARTY OF THE PA |  |  |  |  |  |  |  |  |
| Ans. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| 0 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | a               | c a a                      | c c d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |  |  |  |  |  |
| MDCT PRIPBOOK 303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | a               |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |  |  |  |  |  |
| 303                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                 | By AZHAR IQ                | BAL 0336-7098894                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |  |  |  |  |  |

- 34. If root mean square velocity of a gas at temperature 27°C is v. Then root mean square velocity of gas at temperature 327°C will be:
- (b) 2v
- (c)  $\sqrt{2} v$
- 35. If helium gas is enclosed in a cylinder then molecules will have?
  - (a) Translational K.E. (c) Vibrational K.E.

- (b) Rotational K.E. (d) All of these
- 36. Internal energy of an ideal gas at temperature T is U, then is internal energy at temperature 4T will be:
  - (a) U
- (b) 2U
- (c) U/2

37. In which of the following graph work done is zero.







(d) None of these

- 38. General gas constant have same units as that of:
  - (a) Boltzmann constant
- (c) Molar specific heat

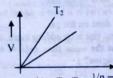
- (d) Internal energy
- 39. If 50 J work is done on the system and at same time 100 J heat is added to the system, then change in internal energy of the system will be:
  - (a) 50 J
- (b) 150 J
- (c) -50 J
- (d) -150 J

(d) Isochoric

- 40. For which of the following process then its change in internal energy will be:
  - (a) Isothermal (b) Adiabatic
- 41. Heating food in pressure cooker is an example of: (a) Isothermal process
- (c) Isobaric
  - (b) Adiabatic process

(c) Isobaric process

- (d) Isochoric process
- 42. If two different gases undergo isothermal expansion at temperature T1 an T2 as shown in the figure below then:



- (a)  $T_1 = T_2$

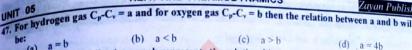
- Cannot be determined
- 43. When water is heated isothermally, then its heat capacity will be:
- (b) Infinite
- (c) 4.18 JK
- (d) 4180 JK-1
- 44. The difference between molar specific heat of a gas at constant pressure and molar specific heat at constant volume is: (in SI units)
  - (a) 1.38x10⁻²³
- (b) 8.314
- (c)  $6.02 \times 10^{23}$  . (d) Zero
- 45. If γ is ratio of molar specific heat of a gas at constant pressure to molar specific heat of gas at constant volume and R is general gas constant then which of the following relation is true?

- $C_p C_v = R$  (d) All of these
- 46. If 100 J work is done on the system during an adiabatic compression then heat added to system

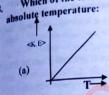
| no | (a) 0. | in int | ernal | energy<br>(b |     | De: | J   | (c) 0, -100 J |     |     |     | (d) | 50J, 50 J |
|----|--------|--------|-------|--------------|-----|-----|-----|---------------|-----|-----|-----|-----|-----------|
|    | Sr.    | 34.    | 35.   | 36.          | 37. | 38. | 39. | 40.           | 41. | 42. | 43. | 44. | 45. 40.   |
|    | Ans:   | С      | a     | c            | c   | c   | ь   | a             | c   | С   | b   | b   | da        |

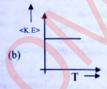
By AZHAR IQBAL 0336-7098894

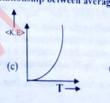


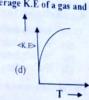


which of the following graph represents the relationship between average K.E of a gas and







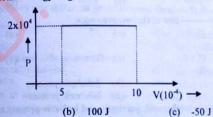


49. Unit of general gas constant in terms of base units is:

- (a) Kgms⁻² mol⁻¹K⁻¹ (b) Kgm²s⁻²mol k⁻¹
- (c)  $Kgm^2s^{-3}mol^{-1}k^{-1}$  (d)  $Kgm^2s^{-2}mol^{-1}k^{-1}$

(d) 150 J

50. When 50 J heat is added to a gas it undergoes an expansion as shown in the figure below, then the change in internal energy of gas will be:



| Sr.  | 47. | 48. | 49. |
|------|-----|-----|-----|
| Ans: | a   | a   | С   |

### PRACTICE TEST NO. 3

- 1. Which of the following is not a state function?
  - (a) Work done
- (b) Internal energy (c) Gravitational P.E (d) None of these
- 2. A gas undergoes an expansion then which of the following is correct statement:
  - (a) Work is done on the system and it is taken as -ve
  - (b) Work is done by the system and it is taken as -ve
  - (c) Work is done on the system and it is taken as +ve
  - (d) Work is done by the system and it is taken as +ve
- 3. Unit of Boltzmann constant is same as that of:
  - (a) Specific heat
- (b) Heat capacity
- Temperature (c) coefficient of resistance
- (d) Decay constant

- 4. Root mean square velocity of a gas is given as:

(c) W = 0

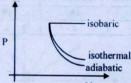
- All of these
- 5. Metabolism is an example of -- law of thermodynamics. (a) Zeroth
- 6. If a gas expand isothermally then: (a)  $\Delta U = 0$
- (b) 1st
- (d) None of these (d) None of these

- (b) O = 07. Cloud formation is an example of:
  - (a) Isothermal process

(b) Adiabatic process

(c) Isobaric process

- (d) Isochoric process
- 8. If W1, W2 and W3 are work done in isothermal, adiabatic and isobaric process respectively as shown in figure below, then



- (a)  $W_1 = W_2 = W_3$
- (b)  $W_1 < W_2 < W_3$
- $W_2 < W_1 < W_3$
- (d)  $W_3 < W_2 < W_1$

- 9. Specific heat of a substance depends upon:
  - (a) Heat added to system and change in temperature
- (b) Amount of substance (d) All of these

- (c) Nature of substance
- 10.  $PV^{\gamma}$  = constant is true for:
  - (a) Isothermal process

(b) Isobaric process

(c) Isochoric process

- (d) Adiabatic process
- 11. For an ideal gas if  $C_v = \frac{5R}{2}$  and  $C_p = \frac{7R}{2}$  then the gas is:
  - (a) Mono atomic
    - (b) Diatomic
- (c) Polyatomic
- (d) None of these

- 12. The value of y for mono atomic gas is:
  - (a) (b)

(c)

(d)

- 13. Which of this is constant in isochoric process?
  - (a) Volume
- (b) Work done
- (c) Entropy
- (d) Internal energy

| Sr.  | 1. | 2. | 3, | 54. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. |
|------|----|----|----|-----|----|----|----|----|----|-----|-----|-----|-----|
| Ans: | a  | d  | b  | d   | b  | a  | ь  | c  | С  | d   | ь   | a   | a   |

MDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

## HEAT AND THERMODYNAMICS

- 14. The first law of thermodynamics can be stated as:
- (a)  $Q = \Delta U + W$
- (c)  $Q=\Delta U-W$
- (d)  $Q = \Delta U \times W$
- (a) (c) Q=1 15. Two identical gases expand (i) isothermally (ii) adiabatically leothermal process (a) Isothermal process
  - (b) Adiabatic process
- Neither of them (d) Equal in both cases (c) Equal in both cases

  16. What does the constant n represent in the equation of state for an ideal gas PV = nRT?

  Number of atoms in the gas
- (a) Number of atoms in the gas
- (b) Number of moles of the gas
- Number of nucleons (d) Number of molecules of gas 17. Which of the following is not an assumption of the kinetic model of an ideal gas?
- Particles collide elastically
  - Kinetic energy of a given particle is same
- (b) The duration of collision between molecules is very short
- Intermolecular potential energy of the molecules is zero
- 18. Which of this is constant in adiabatic process
  - (a) Total heat

- (b) Entropy
- Work done (d) Both a and c
- 10 If the system goes from two different paths to same final state, then change in internal energy for both systems is
  - (a) Same

- (b) Different (d) Not enough information
- (c) May be same 20. When heat is given to isobaric process then:

  - (a) Work is done by the gas (b) Internal energy of gas decrease (c) Both a and b
- (d) None of them 21. A monatomic gas at pressure P and Volume V expands isothermally to volume 2V and then adiabatically to volume 16V. The final pressure is:  $(r = \frac{5}{2})$
- (b) 64 P
- (c) 32P
- (d) P/64

- 22. Internal energy of an ideal as depends upon
  - (a) Pressure
- (b) Volume
- (c) temperature

(c) 600J

- (d) all
- 23. Slope of adiabatic(ks) and isothermal(kt) curve related as: (a)  $K_s = \gamma kt$ 
  - - (b) Ks=kt/v
- (c) ks=kt
- (d) ks=2kt

(d) 300J

- 24. What is the internal energy change in system that has absorbed 800J of heat and work done is (a) 1300J (b) 550J
- 25. In SONAR we use:

  - (a) Water waves

- (c) Ultrasound waves
- (b) Sound waves (d) Ultraviolet rays
- 26. In thermodynamics first law is related with (a) Pressure conservation
- (c) Temperature conservation 27. Temperature is defined by
- (b) Entropy conservation (d) Energy conservation
- (a) First law of thermodynamics
- Zeroth law of thermodynamics
- Second law of thermodynamics (d) Third law of thermodynamics
- 28. Which one of the following is not the unit of heat?
- (c) Watt.sec
  - (d) Watt
- 29. If a system undergoes a cyclic process then: (b) Q=0=W 14. 15. 16. 17. 18. 19. 20. a b b

d

- (c)  $\Delta U = 0$ 22.
- (d) W=0

b

HEAT AND THERMODYNAMICS

## **UNIT 06 >>**

## **ELECTOSTATICS**

| PRACTICE TEST NO. 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| the state of the s |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| A soap bubble is given a negative charge, then its radius:  (a) Decreases  (b) Increases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Pensing and (d) Increases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | the spirit of the second of th |
| (c) Remains unchanged (d) Nothing can be predicted  2. Two charges q ₁ and q ₂ are placed in a vacuum at a distance d and force acting between them is F.  If a medium of dielectric constant 4 is introduced around them, the force now will be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | the state of the s |
| If a medium of dielectric constant A is introduced around at a distance d and force acting between them is p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Control of the Contro |
| (a) 4 F                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | And the state of t |
| 3. Inside a hallow charged spherical conductor, the potential:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (a) 4:3 (b) 3:4 (c) 2:3 (d) 3:2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Is constant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 12. A charge of 5 C experiences a force of 5000 N. When it is kept in a uniform electric field. What is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (b) Varies directly as the distance from the centre                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | the notential difference between two points separated by a distance of 1 cm:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (c) Varies inversely as distance from centre                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (a) 10 V (b) 250 V (c) 1000 V (d) 2500 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| (d) Varies inversely as source of the list of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 13. Two electric charges 12 µC and -6 µC are placed 20 cm apart in air. There will be a point P on the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4. The magnitude of electric field intensity F is such that an electron about the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | line joining these charges and the region between them, at which the electric potential is zero.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| an electrical force equal to its weight is given by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | The distance from -6µC charge is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (a) mge (b) mg/e (c) e/mg (d) $\frac{e^2}{a}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (a) 6.6 cm (b) 13.4 cm (c) 10 cm (d) 5 cm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5. At a certain distance from a point charge the electric field is 500 V/m and the potential is 3000 V.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 14. Consider two point charges of equal magnitude and opposite sign separated by a certain distance. The neutral point due to them:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| What is this distance:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) 6 m (b) 12 m (c) 36 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (a) Does not exist (b) Will be in mid way between them                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| o. A particle of mass m and charge q is placed at rest in a uniform electric field E                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c) Lies on the perpendicular bisector of line joining the two                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| The kinetic energy attained by the particle after moving a distance 'Y' is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d) Will be closer to the negative charge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (a) $qEy$ (b) $qE'y$ (c) $qFy$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 15. A point charge is kep at the centre of a metallic insulated spherical shell. Then:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 7. The potential at a point, due to positive charge of 100 µC at a distance of 9m is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (a) Electrical field out side the sphere is zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (a) 10 V (b) 10° V (c) 10° V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (b) Electric field inside the sphere is zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 8. A capacitor is charged by using a battery which is then disconnected. A dielectric slab is the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (c) Electrical potential inside the sphere is zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| supped between the plates, which results in:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (a) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (a) Reduction of charge on the plates and increase of potential difference across the plates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 16. The dielectric constant K of an insulator can't be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (b) Increase in potential difference across the plate, reduction in stored energy, but no change in the charge on the plate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Decrease in potential difference across the plate reduction is the decrease in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | work done by an external agent in separating the second to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (c) Decrease in potential difference across the plate, reduction in stored energy, but no change in the charge on the plate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (d) Decrease in potential difference across the plate, increase in stored energy, but no change in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 18. Two capacitors connected C and C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| the charge on the plate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 18. Two capacitors connected C ₁ and C ₂ are connected in series and potential difference V is applied  (a) $V_2^{C_2}$ (d) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 9. If three capacitors each of capacity 1 µF are connected in such a way that the resultant capacity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (a) V ² 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| is 1.5 $\mu$ F, then:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 17. A parallel plat $C_1$ $C_1+C_2$ $C_1+C_2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| (a) All the three are connected in series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | The dielectric condenser has a capacitance 50 $\mu$ F in air and 110 $\mu$ F when immersed in an oil.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (b) All the three are connected in parallel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | The dielectric constant 'K' of the oil is:  (a) 0.45  (b) 0.65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (c) Two of them are in parallel and connected in series to the third                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (b) 0.55 (c) 1.10 (d) 2.20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (d) Two of them are in series and then connected in parallel to the third                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 20. For a positive charge, the electric field lines are:  (a) Directed radially outward  (b) Directed along ziz-zag path                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Directed radialles: (b) Directed along 212-2ag path                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Sr. 1 2 3 4 5 6 7 8 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (d) Any of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Ans: b d a b a c b c d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Ans: b 11, 12, 13, 14, 15, 16, 17, 18, 19, 20.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | D a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| NMDCAT PREP BOOK 310 By AZHAR IOBAL 0336-7098894                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | a a a b d c d d a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

By AZHAR IQBAL

**ELECTROSTATICS** 

Four capacitance between A and B and between A and C will be:

potential at the centre of the sphere is:

UNIT 06

Zayan Publish

10. A hollow metal sphere of the sphere is:

10. A hollow metal at the centre of the sphere is:

(a) 0V (d) 20 V

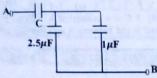
11. Four capacitors of each of capacity 3 F are connected as shown in the figure. The ratio of

(c) 5 V

|  | Т |  |
|--|---|--|
|  |   |  |
|  |   |  |

| Zaman | Publich |
|-------|---------|
| zavan | Publica |

21. The equivalent capacitance between A and B in the figure is  $1\mu$ F. Then the value of capacitance C is:



- (a)  $1.4\mu F$
- (b) 2.5µF
- (c) 3.5µF
- (d) 1.2µF
- 22. Two point particles, in with charge 8 x 10.9 C and the other with charge -2 x 10.9 C, are separated by 4 m. The electric field in N C midway between them is:
- (b) 36 x 10⁻⁹
- (c) Zero
- 23. The correct expression for electric potential at a distance r due a point charge Q is:
  - (a)  $V = \frac{kQ}{Q}$
- (b)  $V = \frac{kE}{}$

- 24. A charge of 0.01 C accelerated through potential difference of 1000 V acquires K.E?
- (b) 200 J
- (c) 100 J
- 25. The potential difference between two metal plates is halved and distance between them is doubled, the value of electric field strength between them becomes:
  - (a) Half of the original
    - (c) Double of the original

- (b) Same as original
- (d) One-fourth of the original

- 26. The units of  $\varepsilon_r$  are:
  - (a)  $C^2 N^{-1} m^{-2}$
- (b)  $N C^2 m^{-2}$ 
  - (c) N m² C⁻²
- (d) Unit-less
- 27. The electric field between oppositely charged infinite sheets of plates is given by:
  - (a)  $E = \left(\frac{\sigma}{2s}\right)$
- (b)  $E = \left(\frac{2\sigma}{\epsilon}\right)$
- (c)  $E = \left(\frac{\sigma}{\epsilon}\right)$
- (d) Zero
- 28. The potential gradient between the two charged plates having separation of 0.5 cm and potential difference of 12 volt is:
  - (a) 240 N C-1
- (b) 2.4 N C⁻¹
- (c) 24 N C-1
- (d) 2400 N C-1
- 29. The capacity of parallel plate capacitor is 5  $\mu$ F. When a glass plate is placed between the plates of the condenser, its potential difference reduces to  $\frac{1}{r}$  of the original value. The value of dielectric constant of glass is:
- (b) 10 . (c) 5 (d) 40
- 30. By placing the dielectric between the plates of an isolated charged capacitor, the energy stored: (c) Becomes zero
  - (d) Decreases

- (a) Remains same (b) Increases 31. The quantity  $\frac{1}{2} \varepsilon_0 \varepsilon_r E^2$  has significance of:
  - (a) Energy / capacitance

(b) Energy / volume

(c) Energy / coulomb

- (d) Energy / volt
- 32. Three capacitors of capacitance 2  $\mu$ F each are connected in series to a power supply of 6 volt. The voltage across each capacitor is:
- (b) 3 V
- (c) 2 V
- (d) 6 V
- 33. If applied voltage to a capacitor becomes half then capacitance becomes:
  - (a) Double
- (b) Half
- (c) Four time
- (d) Remains same

- 34. A capacitors may be considered as a device for:
  - (a) Storing electrical energy
- (b) Decreasing resistance

(c) Increasing resistance

(d) Storing Chemical energy

| - | Sr.  | 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33. 34. |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
|   | Ans: |     | d   | a   | a   | d   | d   | a   | d   | c   | d   | b   | b   | da      |

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By AZHAR IQBAL 0336-7098894

#### **FLECTROSTATICS**

- (c)  $U = \frac{1}{2} \varepsilon_0 \varepsilon_t E$

- (a)  $U = \frac{1}{2} \varepsilon_0 \varepsilon_r E^2$ 36. The electronic flashguns in cameras is an application of:
- (a) Coulomb's law

- (b) Capacitor
- (d) Diode
- (c) Gauss's law 17. Three objects are brought close to each other, two at a time, when objects A and B are brought Three objects A and B are brought together, they repel. When objects B and C are brought together, they also repel. Which of the following are true?
  - (a) Objects A and C possess charges of the same sign, but not B
  - (b) Objects A and C possess charges of opposite sign
  - (c) All three objects possess charges of the same sign
  - (d) One objet neutral

## 38. Negative of potential gradient is equal to

- (a) Electric intensity (b) Electric flux
- intensity
- (d) Magnetic flux
- 39. A 18.0 V battery is connected to a capacitor, resulting in 27.0  $\mu$ C of charge stored on the capacitor. How much energy is stored in the capacitor?
  - (a)  $2.43 \times 10^{-4}$

(b)  $2.86 \times 10^{-4}$ 

(c)  $2.43 \times 10^{-2}$ 

- (d)  $2.86 \times 10^{-2}I$
- An You have three capacitors, each of 2µC. In which of the following combinations of the three capacitors, the resultant capacitance is 3µC?
  - (a) All three capacitors in series
  - Two capacitors are in series, one in parallel
  - (c) Two capacitors are in parallel, one in series
  - (d) All three capacitors in parallel
- 41. Which one is the correct statement about selenium?
  - (a) Selenium is a good conductor
  - (b) Selenium is a good insulator
  - (c) Selenium is an insulator in the dark and becomes conductor when exposed to light
  - (d) Selenium is an conductor in the dark and becomes insulator when exposed to light
- 42. What is the formula for Coulomb's law?
- (a)  $F = kq_1q_2/r^2$
- (b)  $F = 2kq_1q_2/r^3$
- (c)  $F = kq_1/r$
- (d)  $F = kq_1/q_2$

- 43. Electric potential energy per unit charge is

  - (a) Electric flux
    - (b) Electric potential (c) Electric field
- (d) Electric intensity
- 44. If a particle have charge q is accelerated through a potential difference V., then energy acquired by the particle is: (a)  $Vq^2$
- 45. Electric intensity and electric potential are related as:
  - (a) Electric field intensity is equal to the negative of the gradient of electric potential
  - (b) Electric field intensity is equal to the gradient of electric potential
  - (c) Electric field intensity is equal to the square of the gradient of electric potential
- (d) Electric field intensity is equal to the twice of the gradient of electric potential 46. A capacitor stores 5.3×10⁻⁵ C of charge when connected to a 6.0 V battery. How much charge does the capacitor store when connected to a 9.0-V battery?
  - (a) 79.5 µC
    - (b) 35.3 μC
- (c) 79.5 pC
- (d) 35.3 pC

| Sr 2m             | To Depth 1 |     | 11295 |     |     |     |     |     |     |     |     |
|-------------------|------------|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| Ane: 35.          | 36.        | 37. | 38.   | 39. | 40. | 41. | 42. | 43. | 44. | 45. | 46. |
| Sr. 35.<br>Ans: a | b          | a   | a     | a   | b   | c   | a   | b   | d   | a   | a   |

(a) never cross each other

- (b) Can cross each other
- (c) Depends on shape of charge
- (d) Not enough information
- (c) Depends on snape of charge  $2\mu C$  and mass 2 g moving through electric field strength 20N/C?
  - (a)  $4 \text{ cm/s}^2$
- (b) 2 cm/s²
- (c)  $40 \text{ cm/s}^2$
- (d)  $20 \text{ cm/s}^2$
- 49. Two point charges attract each other with an electric force of magnitude F. If the charge on one of the particles is reduced to one half its original value and the distance between the particles is doubled, what is the resulting magnitude of the electric force between them?
  - (a) F
- (b) F/2

- 50. Electric charge on an object is measured as 5 micro coulombs. How the value of this charge can be expressed in terms of base units:
  - (a) 5 x 100 ampere second

(b) 5 x 10⁺⁶ coulomb second

(c) 5 x 10⁻⁶ ampere second

(d) 5 x 100 coulomb second

### PRACTICE TEST NO. 2

- 1. The electric potential at any point in an electric field can be defined as:
  - (a) Work done in bringing a unit positive charge from infinity to that point
  - (b) Work done in bringing a unit positive charge from infinity to that point while keeping the charge in equilibrium.
  - (c) Work done in bringing a unit negative charge from infinity to that point while keeping the charge in equilibrium.
  - (d) Work done in bringing a unit negative charge from infinity to that point while keeping the charge in equilibrium
- 2. The number of electrons taken out from a body to produce 1 coulomb of charge will be:
  - (a)  $6.25 \times 10^{18}$
- (b)  $625 \times 10^{18}$
- (c)  $6.023 \times 10^{23}$
- 3. An electron is held within electric field. What happens when electron is released?
  - (a) It moves in the direction of electric field
  - (b) It accelerates in the direction of electric field
  - (c) It moves in the direction opposite to electric field
  - (d) It accelerates in the direction opposite to electric field
- 4. A capacitor of capacitance C is connected with resistance R. The time constant of the circuit of the circuit would be:.....
  - (a) RC
- (c) e^RC
- (d) R+C
- 5. The electric potential difference between two points A and B in an electric field can be defined as:
  - (a) Work done in carrying a unit positive charge from infinity to B while keeping the charge in equilibrium
  - (b) Work done in carrying a unit positive charge from A to infinity while keeping the charge in equilibrium
  - Work done in carrying a unit positive charge from A to B while keeping the charge in
  - (d) Work done in carrying a unit positive charge from A to B
- 6. 1 microvolt is:
  - (a)  $1x10^{-3} V$
- (b) 1x10⁴ V
- (c) 1x10⁻⁵ V
- (d) 1x10⁻⁶ V

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| Sr. 47.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 48.      | 49. | 50. | 1.       | 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3. | 4.        | 5. 6. |
| Ans; a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | a        | d   | c   | b        | a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | С  | a         | c d   |

By AZHAR IQBAL 0336-7098894

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- You have three capacitors and a battery, in which of the following combinations of the three You have three capacitors is the maximum possible energy stored when the combination is attached to the battery? In parallel (b) In series

  - Either way because both combination have the same capacitance
  - We cannot determine, because presence of resistance in the circuit determines capacitance
- (d) We cannot three capacitors, each of 2µC. In which of the following combination of the three capacitors, the resultant capacitance is maximum?
- (a) All three capacitors in series Two capacitors are in series, one in parallel
- Two capacitors are in parallel, one in series
- (d) All three capacitors in parallel
- 9. Electric field lines provide information about:
- (a) Field strength

(b) Direction

(c) Nature of charge

- (d) All of these
- 10. If two point charges of charge q1 and q2 are placed at distance d. The force between them is proportional to: ......
  - (b)  $q_1 q_2$ (a)  $q_1 + q_2$
- (c) q1/q2
- (d)  $q_1 \times q_2$
- 11. Two point charges are at the distance d. If force between these two charges is F, then what is the force between charges when the distance between them is 3d?

- 12. A test charge of 23 µC is at a point P where an external electric field is directed to the left and has a magnitude of 3.1 × 106 N/C. If the test charge is replaced with another test charge of  $13\mu C$ . What happens to the external electric field at P?
  - (a) It remain same
  - (b) It reverse direction
  - (c) It change in a way that cannot be determined
  - (d) 3.1 × 105 N/C
- 13. The minimum charge on an object cannot be less than:
  - (a) 1.6×10-19C (c) 9.1×10-31C

- (b) 9×109C (d) 1.6×10-27C
- 14.  $\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots + \frac{1}{C_n}$  is the combination in
- (a) Series (b) Parallel
- (c) Both of them
- 15. You have three capacitor, each of  $2\mu C$ . In which of the following combinations of the three
- capacitor, the resultant capacitance is  $6\mu C$ ? (a) All three capacitors in series
- Two capacitors are in series, one in parallel
- Two capacitors are in parallel, one in series 16. Electric field lines due to a positive charge are: ...
  - (d) All three capacitors in parallel
  - (a) Always horizontal
- (b) Always vertical
- (c) Radially towards the charge 17. The potentials of the two plates of a capacitor are +12.5 V and -12.5 V. The charge on one of the plates is 60 C. The capacitance of the capacitor is:
  - - (b) 3.5 F
- (c) 4.2 F
- (d) 1.7 F

| 8r. 7   | LESS! |                   |     |     |     |     |     |               |                         |
|---------|-------|-------------------|-----|-----|-----|-----|-----|---------------|-------------------------|
| Ans: 8. | 9.    | 10.               | 11. | 12. | 13. | 14. | 15. | 16.           | 17.                     |
| a d     | d     | d                 | b   | a   | a   | a   | d   | d             | a                       |
| TRUD IV |       | The second second |     |     |     |     |     | THE RESIDENCE | THE STATE OF THE PARTY. |

- (a) Be fully charged in 1 second by current of 1 ampere
- (b) Store 5 coulomb of charge at potential difference of 1 volt
- (c) Gain 1 joule of energy when 1 coulomb of charge is stored on it
- (d) Discharge in 1 s when connected across a resistor of resistance 2 ohm
- 19. The automobile wind shield wipers works on the principle of
  - (a) Electricity

- (b) Battery
- (c) Charging and discharging of capacitor
- (d) Charging and discharging of inductor
- 20. 100 V potential difference is applied across the plates of 1  $\mu$ F capacitor. What is the energy stored capacitor?
  - (a) 0.5 mJ
- (b) 5 mJ
- (c) 0.05 mJ
- (d) 50 mJ
- 21. A capacitor acts as blocking elements when applied signal is:
- (b) Sinusoidal
- (c) D.C
- (d) All of these
- 22. When two capacitors of same capacitance are connected in parallel and then in series (same battery is connected across combination in both cases), the energy stored:
  - (a) Is greater for series combination
- (b) Is greater for parallel combination
  - (c) Is same for both combination
  - (d) Is double in series combination than parallel combination
- 23. A glass plate is put within the plates of a charged parallel plate condenser. Which of the following quantities does not change?
- (a) Energy stored (b) Charge (c) Electric intensity (d) Capacity
- 24. A 4 µF capacitor is charged to 400 V and then its plates are joined through a resistance of 2k0 The heat produced in the resistance is:
- (a) 1.28 J (b) 0.64 J (c) 0.32 J 25. The work done in moving a charge along an equipotential surface is:
  - (a) Depends on the path taken (b) Equal to zero

(c) Greater than zero

- (d) Negative
- 26. The force on proton in electric field of magnitude 106 N C1 is:
  - (a) 1.6 x 10⁻¹⁵ N
- (b)  $1.6 \times 10^{-13} \text{ N}$  (c)  $1.6 \times 10^9 \text{ N}$
- (d) 1.6 x 10¹³ N
- 27. An alpha particle has twice the charge of a proton. Two protons separated by a distance 'd' exert a force 'F' on each other. What must be the separation between two alpha particles so that they also exert a force 'F' on each other?

- (b)  $\sqrt{2}d$  (c) d/2 (d)  $d/\sqrt{2}$
- 28. The work done on a unit positive charge while moving it from infinity to a point in electric field keeping the charge in equilibrium is called:
  - (a) Electric potential

(b) Potential difference

(c) Electric field intensity

- (d) Electric force
- 29. The equipotential lines are always to field line:
  - (a) Parallel
- (b) Anti-parallel (c) Perpendicular (d) Inclined at 60°
- 30. The electric field at a certain distance from an isolated alpha particle is 3.0 x 107 N C1. What is the force on an electron when placed at that distance from the alpha particle? (a)  $4.8 \times 10^{-12} \text{ N}$  (b)  $3.0 \times 10^7 \text{ N}$  (c)  $2.6 \times 10^{12} \text{ N}$  (d)  $6.0 \times 10^2 \text{ N}$

- 31. The ratio of the electric force between two protons to that between two electrons separated by same distance is of the order of: (c) 10³⁹ (d) 1
  - (a)  $10^{42}$
- (b) 10³⁶

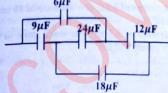
| Sr.  | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. 31. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| Ans: | b   | С.  | b   | c   | b   | b   | c   | b   | b   | a   | a   | c   | a d     |

MDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

#### **ELECTROSTATICS**

- 32. What is true about electric field lines: (a) No two lines can cross each other
  - Lines are closer where field is weak
  - Tangent to field line gives direction of electric field
  - Both A and C
- (d) Both A and S hown in the adjoining figure, the equivalent capacity between A and B will  $6\mu F$



(a)  $10 \, \mu F$ 

- (c) 15 µF
- (d) 1.2 uF
- 34. Two capacitor of capacity of 0.3 µF and 0.6 µF respectively are connected in series. The combination is connected across a potential of 6V. The ratio of energies stored by the capacitors will be:
- (b) 2 (c)  $\frac{1}{4}$

- 35. A capacitor is used to store 24 watt hour of energy at 1200 V. What should be the capacitance of capacitor?
  - (a) 120 mF
- (b) 120 uF
- (c) 24 µF
- (d) 24 mF
- 36. The true statement is, on increasing the distance between the plates of a parallel plate capacitor:
  - (a) Electric intensity between the plates of capacitor will increase
  - (b) Electric intensity between the plates of capacitor will decrease
  - (c) Electric intensity between the plates of capacitor will remain unchanged
  - (d) The P.D between the plates will decrease
- 37. An α-particle is accelerated through a potential difference of 200 V. The increase in its K.E is:
  - (a) 100 eV
- (b) 200 eV
- (c) 800 eV
- 38. Electric field intensity at a point in between two parallel sheets with like charges of same surface charge densities is:
- (b)  $\frac{\sigma}{\varepsilon_o}$  (c)  $\frac{2\sigma}{\varepsilon_o}$
- 39. An electron enters between two horizontal plates separated by 2mm and having a potential difference of 1000 V. The force on electron is:
  - (a) 8x10⁻¹² N
- - (b) 8x10⁻¹⁴ N
- (c) 8x10° N
- (d) 8x10⁻¹⁴ N
- 40. Two positive charge of 20 C and Q coulomb are situated at a distance of 60 cm. The neutral point between them is at a distance of 20 cm form the 20 C charge. Charge Q is:
- (b) 40 C
- (c) 60 C
- 41. The charges on two sphere are  $+7\mu C$  and  $-5\mu C$  resectivly. They experience a force F. If each of them is given and additional charge of -2  $\mu$ C, the new force of attraction will be:
  - (a) F
- (b) 2F

(b) 1:2

(c) 4:1

- 42. Two capacitors of equal capacity are first connected in parallel and then in series. The ratio of the total capacities in the two cases will be:

| 52. | 33. | 34. | 35 | 36 | 37 3 | 8 39 | 40. | 41. |
|-----|-----|-----|----|----|------|------|-----|-----|

AT PREP BOOK

43. The capacity of a parallel plate condenser is C. Its capacity when the separation between the plates is halved will be:

(a) 4 C

(b) 2 C

(c) C/2

44. The capacity of a parallel plate condenser if  $5\mu$ F. When a glass plate is placed between the plates of the conductor, its potential becomes 1/8th of the original value. The value of dielectric constant

(a) 1.6

(b) 5

(d) 40

45. Electric field strength due to a point charge of 5  $\mu$ C at a distance of 80 cm from the charge is:

(a) 8 x 10⁴ N/C

(b) 7 x 104 N/C

(c) 5 x 10⁴ N/C

(d) 4 x 10⁴ N/C 46. A charge of 5 C is given a displacement of 0.5 m. The work done in the process if 10 J. The potential difference between the two points will be:

(a) 2 V

(a) 10⁴²

(b) 0.25 V

(c) 1 V

(d) 25 V

47. The unit of electric field is not equivalent to:

(a) N/C

(b) J/C

(c) V/m

(d) J/C-m

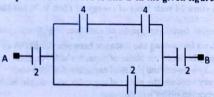
48. When the distance between charged particles become halved the force between them becomes: (a) One-fourth (b) Half (c) Double (d) Four times

49. Fg and Fe represents gravitational and electrostatic force respectively between electrons situated at a distance 10 cm. The ratio of Fg/Fe is of the order of:

(b) 10

(d) 10⁻⁴³

50. What is the equivalent capacitance between A and B in the given figure?



(b) 5 F

(c) 4/5 F

| Sr   | 43 | 44. | 45. | 46. | 47. | 48. | 49. 50. |
|------|----|-----|-----|-----|-----|-----|---------|
| Ans: | b  | c   | b   | a   | b   | d   | d c     |

By AZHAR IQBAL 0336-7098894

## PRACTICE TEST NO. 3

+2C and +6C charges are repelling each other with a force of 12 N. If each charge is given -2C of charge, then the value of the force will be:

(a) 4 N (attractive) (b) 4N (repulsive) (c) 8N (repulsive) (d) Zero

**FLECTROSTATICS** 

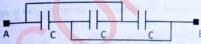
Dielectric constant for metal is:

(b) Infinite

(d) Greater than 1

(a) Zero (a) Connected as shown in figure. Then the

equivalent capacitance between A and B is:



(b) 3C

(c) C/3

(d) 3C/2

4. The electric field near a conducting surface having a uniform surface charge  $\sigma$  density is given

(a) and is parallel to the surface

 $\frac{\sigma}{2s}$  and is parallel to the surface

(c)  $\frac{\sigma}{}$  and is normal to the surface

(d)  $\frac{\sigma}{2\varepsilon}$  and is normal to the surface

5. An alpha particle is accelerated through a potential difference of 106 volt. Its kinetic energy will

(a) 1 MeV

(b) 2 MeV

(c) 4 MeV

(d) MeV

6. What is the potential energy of the two equal positive point charge of 1 µC each held 1 m apart in

(a)  $9 \times 10^{-3} \text{ J}$ 

(b) 9 x 10⁻³ eV

(c) 2eV/m

(d) Zero

7. Figure shows three points A, B and C in a region of uniform electric field E. If VA, VB and VC represents the electric potential at points A, B and C respectively, then:



(a)  $V_A = V_B = V_C$ 

(b)  $V_A = V_B > V_C$ 

(c)  $V_A = V_B < V_C$ 

(d)  $V_A > V_B = V_C$ 

8. Two capacitances of capacity C1 and C2 are connected in series and potential difference V is applied across it. Then the potential difference across C1 will be:

(a)  $V^{\frac{c_2}{2}}$ 

(b)  $V^{\underline{c_1}+\underline{c_2}}$ 

9. A body has - 80 micro coulomb of charge. Number of additional electrons in it will be:

10. A particle 'A' has charge +q and a particle 'B' has charge +4q with each of them having the same (b) 5x10¹⁴ mass m. When allowed to fall from rest through the same electric potential difference, the ratio of their speed  $\frac{v_a}{v_b}$  will become:

(a) 2:1

(c) 1:4

II. When a proton is accelerated through IV, then its K.E will be:

| Sr. 1   | (0) | 164 |    | (c) | 13.6 | ev | (  | d) 1.6 | X 10 |   |
|---------|-----|-----|----|-----|------|----|----|--------|------|---|
| m: d 2. | 3.  | 4.  | 5. | 6.  | 7.   | 8. | 9. | 10.    | 11.  | 1 |
| ALPRI   | Ь   | d   | b  | a   | b    | c  | b  | a      | Ь    |   |

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|--------------|---------------------------------------|---------------------|-----------------|------------|---------------|-------------|---------|----------------|
|              | e of mass 'm' and c                   | harge 'c            | l' is associate | ed troug   | n a potentia  | ii dillere  | nce of  | V volt. It's   |
| energy w     | ill be:                               |                     |                 |            | q             |             | n 9     |                |
| (a) c        | V (1                                  | b) mq               | V               | (c)        | mV            | (           | (d) -m  | ·V             |
| 3. An electr | on having charge 'c                   | and n               | ass 'm' is m    | oving in   | a uniform     | electric f  | ield E. | Its            |
| accelerat    | ion will be:                          |                     |                 |            |               |             |         |                |
| (a) 5        | ,2                                    | b) $\frac{E^2e}{m}$ |                 | (c)        | eE<br>m       | (           | d) -    | 1E             |
|              | city of parallel plat                 | m<br>e canac        | itor increase   |            | ***           |             |         | e              |
| (a)          | Decreases to its area                 | ccapac              | tor increase    | (b)        | Increases to  | its area    |         |                |
|              | Increase of its distan                |                     |                 | (d)        | Both b and    | c           |         |                |
| 15. When a   | capacitor remains c                   | onnecto             | d to a batter   | y and di   | electric slal | b is appli  | ed bet  | ween the       |
| plates, th   | en:                                   |                     |                 |            |               |             |         | Y              |
| (a)          | Potential difference                  | between             | the plates ch   | anged      |               |             |         |                |
| (b)          | Charge flows from b                   | attery to           | the capacito    | r          |               |             |         |                |
| (c)          | Electric field between                | en the pl           | ates increase   |            |               |             |         |                |
| (d)          | Energy store in the                   | capacito            | r decrease      |            |               |             | -       |                |
| 16. The capa | acity of air capacito                 | or is 2µl           | F. If medium    | is place   | d between i   | ts plates.  | The c   | apacity beco   |
| 12μF. T      | he dielectric consta                  |                     | e medium wi     | ll be:     |               |             | (1)     |                |
| (a)          | 5                                     | (b) 3               | dit.            |            | 4             |             |         |                |
|              | m number of capac                     | citors of           | 2μF capacit     | ance eac   | h required    | to obtain   | a cap   | pacitor of 5 µ |
| will be:     |                                       |                     |                 |            |               |             | (4)     | , 41 34        |
| (a)          | 3                                     | (b) 5               |                 | (c)        |               | nt 2 Th     | (d)     |                |
|              | el plate condenser                    | is imme             | ersed in an oi  | i of diele | etric const   | ant 2. 1 ii | e neiu  | between the    |
| plates is    |                                       | 1 to 2              |                 | (h)        | Decreased     | l proporti  | onal to | 1/2            |
| (a)          | Increased proportion                  | nai to 2            | 5               |            | Decrease      |             |         |                |
| (c)          | Increased proportions between two-poi | onal to v           | zes placed at   | certain    | distance is   | F. If the   | magni   | tude of both   |
| 19. The fore | is halved and dista                   | nt char             | ween them is    | anarte     | red, then th  | e new for   | rce be  | tween these    |
| charges      |                                       | ince bei            | ween them a     | quanto     | 2017          |             |         |                |
|              | Half of the original                  |                     |                 | (b)        | Same as       | original    |         |                |
| (0)          | Double of the origin                  | inal                |                 | (d)        | Four time     | es of the o | origina | 1              |
| 20 There a   | re two charges of 2                   | uC and              | 10μC. The       | ratio of   | he electric   | force act   | ing on  | them will be   |
| (2)          | 1:25                                  | (b) 1               | :1              | (c)        | 1:5           |             | (d)     | 5:1            |
| 21 Gauss's   | law can be applied                    |                     |                 |            |               |             |         |                |
| (a)          | Plane surface                         | (b) A               | Any surface     | (c)        |               | urface      | (d)     | Closed surfa   |
| 22. The nes  | gative gradient of e                  | lectric             | potential is a  | lso called | li de         | in la       |         |                |
|              | Potential energy                      | 7 7 5               |                 | (b)        | Electric p    | potential   | differe | nce            |
| (a)          | I Otelitiai ciici s                   |                     |                 |            |               |             |         |                |
| (a)          | Electric field inten                  | sity                |                 | (d)        | Electron      | volt        |         | thom is        |

(c) F

(d) All of these

By AZHAR IQBAL 0336-7098894

(c) 400 V

(b) F/4

(b) 500 V

move a charge of 2 C between these two points?

(a) 300 V

MDCAT PREP BOOK

24. The permittivity of a material medium compared with the permittivity of vacuum is called:

(a) Relative permittivity
(b) Specific inductive capacity

25. What is potential difference between two points in an electric field if it takes 600 J of energy to

| - Ob                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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**ELECTROSTATICS** 

41. If the potential difference across the two plates of a parallel capacitor is doubled, then energy

(a) Remains same (b) Two times (c) Four times

(d) Three times

42. One coulomb charge is carried by:

(a) 6.25 x10⁻¹⁸ electron (b) One electron (c) One proton

(d) 1.6 x10⁻¹⁹

43. The increase in the capacitance of a capacitor due to the presence of dielectric is due to: (a) Electric polarization of dielectric

(b) Density of dielectric

(c) Volume of dielectric

(d) Magnetic dipole moment

44. Find the electric field strength required to hold suspended a particle of mass 10⁻⁶ kg and charge 1.0µC between two plates 10.0 cm apart.

(a) 0.98 V/m

(b) 980 V/m

(c) 9.8 V/m

(d) 98 V/m

45. The ratio of forces between two small spheres with constant charge (a) in air (b) in a medium of dielectric constant K is:

(a) 1·K

(b) K:1

(c) 1:K2

(d) K²:1

46. Electric field lines due to a negative charge are:

(a) Always horizontal (c) Radially towards the charge (b) Always vertical

(d) Radially away from the charge

47. You have three capacitors, each of 3  $\mu$ C. In which of the following combinations of the three capacitors, the resultant capacitance is 9  $\mu$ C?

(a) All three capacitors in series

(b) Two capacitors are in series, one in parallel

(c) Two capacitors are in parallel, one in series

(d) All three capacitors in parallel

48. Coulomb per volt is called:

(a) Ampere

(c) Joule

(d) Farad

49. The unit of electric flux density is:

(a) N/C

(b) V/m

(b) Electron volt

(c) Nm

(d) A and B

50. A charge is moving with velocity v, if enters a uniform electric field  $\vec{E}$ . The direction of  $\vec{v}$  and  $\vec{E}$ are not parallel. What is the path of the charge particle inside the electric field?

(a) Parabolic (b) Circular

(c) Parallel to v

(d) Parallel to E

| Sr.  | 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. 50 | ). |
|------|-----|-----|-----|-----|-----|-----|-----|-----|--------|----|
| Ans: | c   | a   | a   | c   | b   | c   | d   | d   | d      | 1  |

By AZHAR IQBAL 0336-7098894

### PRACTICE TEST NO. 4

FLECTROSTATICS

Many computer keyboard buttons are constructed using capacitors. When a key is pushed down, Many computer has between the moveable plate and the fixed plated is compressed. When the key is the soft insulator between the moveable plate and the fixed plated is compressed. When the key is pressed what happens to the capacitance?

(a) It increases

It decreases

It remains same

It changes in a way you cannot determine because of the complex circuit

 $C_{eq} = C_1 + C_2 + C_3 + \dots C_n$  is the combination in

(c) Both of them

(d) None of them

The distance between two point charges if halved, the force between them would be:

(a) Half

(b) One fourth

(c) Double

(d) Four times

4. The unit of electric field strength is:

(b) N/V

(c) N/C

(d) N m

(a) V/C 5. The force between two charges Q and q, separated by a distance d is F. What will be the force

between them when distance between them is d/2? (b) 2F

(c) F

(d) F/2

(a) 4F 6. Electrostatic force is

(a) Nonconservative (c) Depends on shape of charge (b) Conservative

(d) None of these

7. Charged body attracts uncharged body by .... Induction

(a) Electrostatic (b) Magnetic

(c) Both A and B

(d) None of these

8. After how many time constants a capacitor is about completely discharged? (b) 5 (a) 1 (c) 3 (d) 2

9. Which of the following is the same as farad?

(a)  $\Omega$  s

(b)  $\Omega^{-1}$  s

(c) Ω s'

(d) Ω-1 s-1

10. When area of plates of capacitor is decreased, the capacitance will:

(a) Increase

(b) Constant

(c) Decrease

(d) Become infinite

(d) 6 x 10° C

11. A capacitor of 5 µF is connected with a battery of 12 V, the charge stored in capacitor: (a) 4 x 10⁻⁵ C (b) 6 x 10⁻⁵ C (c) 4 x 10⁻⁶ C

12. The capacitor which charges and discharges quickly will have? (a) Small value of RC

(b) Large value of time constant

(c) Large value of RC (d) Zero value of time constant 13. The area of plates of 1 pico farad capacitor separated by 8.85 mm placed in the air is:

(a) 1 mm²

(b) 10 mm²

(c) 100 mm²

14. A battery is permanently connected to a parallel plate capacitor and the energy stores is x joules. When one plate is moved so that separation of the plate is doubled, the energy now stored in joule

(a) 4 x

(b) x/2

(c) 2 x

(d) x/4

15. Two capacitors of capacitance 0.3  $\mu$ F and 0.6  $\mu$ F respectively are connected in series. The combination is connected across a potential of 6 V. The ratio of energy stored by capacitors is:

(b) 2

(d) 4

16. Capacitor stores energy in the form of: (a) Electric field Electromagnetic field

(b) Magnetic field

(d) Gravitational field

| Sr.  |              |    | Cilia o |    | ETIL |    |    |    |     |     |     |     |     | BELL |     |
|------|--------------|----|---------|----|------|----|----|----|-----|-----|-----|-----|-----|------|-----|
| Ans: | - 1          | 3. | 4.      | 5. | 6.   | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15.  | 16. |
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AT PREP BOOK

Zayan Publisher **ELECTROSTATICS** UNIT 06 17. The electric potential at a point of distance 1 m from 2  $\mu$ C charge is: (b)  $1.8 \times 10^4 \text{ V}$  (c)  $1.8 \times 10^8 \text{ V}$ (d) 1.8 x 10⁵ V (a)  $1.8 \times 10^6 \text{ V}$ 18. Charge is distributed uniformly on the surface of large flat plate. The electric field 2 cm from the plate is 20 N C1. What is the electric field at 4 cm from the plate? (d) 7.5 N C⁻¹ (b) 15 N C⁻¹ (c) 20 N C-1 (a) 120 N C⁻¹ 19. For an isolated positive charge, the zero-field spot lies: (b) At infinity (a) At 2 m from charge (d) At very small distance from charge (c) At 10 m form charge 20. By moving charge of 20 C by 2 cm, 2 J of work is done. The potential difference between the points: (a) 0.1 V (b) 8 V (c) 2 V (d) 0.5 V 21. Which of the following is correct? (a) Joule = coulomb / volt (b) Joule = volt / ampere (c) Joule = volt x ampere (d) Joule = coulomb x volt 22. The vector form of electric field intensity due to a negative charge is: (a)  $\vec{E} = -\frac{kq \, q_0}{r^2} \hat{r}$  (b)  $\vec{E} = \frac{kq \, q_0}{r^2} \hat{r}$  (c)  $\vec{E} = -\frac{kq}{r^2} \hat{r}$  (d)  $\vec{E} = -\frac{kq}{r^2} \hat{r}$ 23. The minimum charge on an object is: (a) 1 C (b)  $6.25 \times 10^{18}$  C (c) 1.6 x10⁻¹⁰ C (d) 1.6 x 10⁻¹⁹ ( 24. The magnitude of  $\frac{1}{4\pi\epsilon_0}$  is: (c)  $8.85 \times 10^{-12}$  (d)  $8.85 \times 10^{12}$ (a)  $9 \times 10^9$ (b) 9 x 10⁻⁹ 25. Three capacitors each of 6μF are available. The minimum and maximum capacitors which be obtained are: (b)  $3\mu F$ ,  $12\mu F$ (c)  $2\mu F$ ,  $12\mu F$ (a) 6µF, 18µF (d) 2µF, 18µF 26. Two capacitors connected in parallel having the capacities C1 and C2 are given 'q' charge, w is distributed among them. The ratio of charges is: (a)  $\frac{c_1}{c_2}$  (b)  $\frac{1}{c_1c_2}$  (c)  $\frac{c_2}{c_1}$  (d)  $C_1C_2$ 27. If there are n capacitors in parallel connected to V volt source, then the energy stored is equal to  $C_1C_2$ (b) CV² (c)  $\frac{1}{2}$ nCV² (d)  $\frac{1}{2\pi}$ CV² 28. A capacitor of capacity 50μF is charged to 10 V, its energy is equal to: (a)  $2.5 \times 10^{-3} \text{ J}$  (b)  $2.5 \times 10^{4} \text{ J}$  (c)  $5 \times 10^{-2} \text{ J}$  (d)  $1.2 \times 10^{8} \text{ J}$ 29. A drop of 10-6 kg water carries 10-6 C charge. What electric field should be applied to balance weight the sale and an asset of the sale and (b) 10 Vm⁻¹ downward (a) 10 Vm upward (c) 0.1 Vm⁻¹ upward (d) 0.1 Vm⁻¹ downward

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UNIT 06

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33. Two plates are 2 cm apart, a potential difference of 10 V is applied between them, the electric field between the plates is:

(b) 500 NC⁻¹ Zayan Publishe (a) 20 NC (d) 250 NC (d) 250 NC (d) 250 NC (e) 34. An electron is moving around the nucleus of a hydrogen atom in a circular orbit of radius r. The coulomb force  $\vec{F}$  between the two is: (a)  $-K\frac{e^2}{r^3}\hat{r}$ (a)  $-K_{r^3}$  (d)  $-K_{r^2}^2\hat{\tau}$ 35. In the circuit diagram shown in the adjoining figure, the resultant capacitance between P and Q 2 uF = 20uF (b) 3 µF (c) 60 µF 36. The capacity of a condenser is  $4 \times 10^{-6}$  farad and its potential is 100 volts. The energy released on discharging it fully will be: (b) 0.04 J (c) 0.025 J (a) 0.02 J 37. An electron enters in an electric field with its velocity in the direction of the electric lines of force. Then, (a) Path of electron will be a circle (b) Path of electron will be a parabola (c) Velocity of electron will decrease (d) Velocity of electron will increase 38. Two unlike charges of magnitude q are separated by a distance 2d. The potential at a point midway between them is: (b)  $\frac{1}{4\pi\varepsilon_0}$  (c)  $\frac{1}{4\pi\varepsilon_0}\frac{q}{d}$  (d)  $\frac{1}{4\pi\varepsilon_0}\frac{2q}{d}$ (a) Zero 39. Two charge +q and -q are situated at a certain distance. At the point exactly midway between (b) Electric field is zero but potential is not (a) Electric field and potential both are zero (c) Electric field is not zero but potential is (d) Neither electric field nor potential is zero 40. Two charged sphere of radii 10 cm and 15 cm are connected by a thin wire. No current will flow, if they have: (a) Same charge on each (b) Same potential (c) Same energy (d) Same field on their surfaces 41. Two electrons are separated by a distance of 1Å. What is the coulomb force between them: (a)  $2.3 \times 10^{-8} \text{ N}$ (b) 4.6 x 10⁻⁸ N (c)  $1.5 \times 10^{-8} \text{ N}$ (d) None of these 42. Two charges each of 1 coulomb are at a distance 1 km apart, the force between them is: (a) 9x10³ Newton (c) 1.1x10⁴ Newton (d) 10⁴ Newton (b) 9x10⁻³ Newton 43. There are two charges +1 micro coulombs and +5 micro coulombs. The ratio of the forces acting on them will be: (a) 1:5 (d) 1:25 (b) 1:1 (c) 5:1 35. 36. 37. AT PREP BOOK

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(c) Parabola

(c) 5000 J

30. The force between the plates of parallel plates capacitor of capacitance C and distance of

31. An electron is moving towards x-axis. An electric field is along y-direction then path of elect

separation of plates D with a potential difference V between the plates is,

(b) Elliptical 32. A proton is accelerated through 50,000 V. Its energy will increase by:

(b) 8x10⁻¹⁵ J

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(a) Circular

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(d) None of the

(d) 50,000 J

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ELECTROSTATICS

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- 44. When 10¹⁴ electrons are removed from the neutral metal sphere, the charge on the sphere
- (a) 16 µC
- (b) -16 uC
- (c) 32 µC
- (d) -32 µC

- 45. The electric charge in uniform motion produces:
  - (a) An electric field only
- (b) A magnetic field only
- (c) Both electric and magnetic field
- (d) None
- 46. An electron and a proton are placed in a uniform electric field, the ratio of their accelerations
  - (a) Zero
- (b) Unity
- (c)  $m_p/m_e$
- 47. What is the magnitude of a point charge due to which the electric field 30 cm away has the
  - (a) 2 x 10⁻¹¹ coulomb

(b) 3 x 10⁻¹¹ coulomb

(c) 5 x 10⁻¹¹ coulomb

- (d) 9 x 10⁻¹¹ coulomb
- 48. A hollow insulated conducting sphere is given a positive charge of  $10\mu$ C. What will be the electric field at the centre of the sphere if its radius is 2 meters:
  - (a) Zero
- (b) μCm⁻²
- (c) 20 μ Cm⁻²

(c) \( \sqrt{2eV/m} \)

- (d) 8 µ Cm⁻²
- 49. An electron of mass 'm' and charge 'e' is accelerated from rest through a potential difference V in vacuum. The final speed of the electron will be:
  - (a)  $V\sqrt{e/m}$
- (b)  $\sqrt{eV/m}$ 50. The energy of a charged capacitor is given by the expression:
  - (c) 2gC

| (d) | q    |
|-----|------|
| (4) | 2.02 |

(d) 2eV/m

| Sr.  | 44. | 45. | 46. | 47. | 48. | 49. | 50. |
|------|-----|-----|-----|-----|-----|-----|-----|
| Ans: | a   | c   | c   | a   | a   | C   | a   |

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## PRACTICE TEST NO. 5

One plate of parallel plate capacitor is smaller than other, then charge on smaller will be:

(b) More than other

(a) Less than other

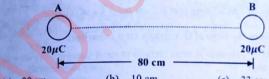
(d) Will depend upon medium between them

- (c) Equal to other 2. Charge on  $\alpha$  - particle is:
  - (a) 4.8x10⁻¹⁹ C
- (b) 3.2 x10⁻¹⁹C
- (c) 1.6x10⁻¹⁹ C
- (d) 6.4x10⁻¹⁹C

If a unit positive charge is taken from one point to another over an equipotential surface, the: (a) Work is done on the charge (b) Work is done by the charge

- (d) Work done is zero
- (c) Work done is constant 4. The unit of intensity of electric field is:
- (c) Vm
- (d) Nm⁻¹
- (a) NC⁻¹ (b) JC⁻¹

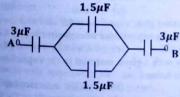




- (a) 20 cm
- (b) 10 cm
- (c) 33 cm
- (d) 40 cm
- 6. The energy stored in condenser of capacity C which has been raised to a potential V is given by:
  - (a) CV
- (b)  $\frac{1}{2}CV^2$
- (c) CV
- 7. A parallel plate capacitor is first charged then a dielectric slab is introduced between the plates. The quantity that remains unchanged:
  - (a) Charge
- (b) Potential
- (c) Capacitance
- (d) Energy
- 8. If a dielectric substance is introduced between the plates of a charged air-gap capacitor, The energy of capacitor will: (a) Increase

  - (c) Remain unchanged

- (b) Decrease
- (d) First increase than decrease
- 9. Two capacitors each of capacity  $2\mu F$  are connected in parallel. This system is connected in series with a third capacitor of 12  $\mu$ F capacity. The equivalent capacity of the system will be:
- (b) 13*u*F
- (d) 3µF
- 10. The capacitance between points A and B in the given circuit will be:



- (a) 1μF
- (b) 2µF
- (c) 3µF
- (d) 4µF

| Sr. 1                      |    |    |    |    |    |    |     |
|----------------------------|----|----|----|----|----|----|-----|
| Ans: 2. 3.                 | 4. | 5. | 6. | 7. | 8. | 9. | 10. |
| Sr. 1. 2. 3.<br>Ans: c b d | a  | d  | b  | a  | b  | d  | a   |

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11. Electric lines of force around a negative point charge are:

- (a) Circular, anticlockwise
- (b) Radial, inwards

(c) Circular clockwise

- (d) Radial, outwards
- (c) Circular, clockwise 12. Electric field at a distance of 10 cm from an isolated point particle with a charge of  $2 \times 10^{-9}$  C is: (b) 18 N C⁻¹ (a) 1.8 N C-1
  - (c) 180 N C⁻¹ (d) 1800 N C⁻¹
- 13. Which physical quantity would result from a calculation in which a potential difference is multiplied by an electric charge:
  - (a) Electric current

(b) Electric power

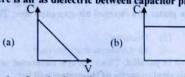
(c) Electric field strength

- (d) Electric energy
- 14. Two charges are placed at a certain distance apart in vacuum. If a glass slab is placed between them. The force between them:
  - (a) Will increase

- (b) Will remain unchanged
- (c) Will decrease
- (d) Will become infinity
- 15. When 1012 electrons are received from a neutral metal sphere. The charge on the sphere becomes:
  - (a) 0.16 µC
- (b) 0.32 μC
- (c)  $-0.1 \mu C$
- (d) -0.32 uC
- 16. What is electric potential energy of 7 nC charge that is 2 cm from a 2 nC charge:
  - (a) 6.3 x 10⁻⁶ J
- (b) 2.3 x 10⁻⁶ J
- (c) 4.3 x 10⁻⁶ J
- (d) 6.3 x 10⁻⁷ J
- 17. Which of the following provides us the slope of Q-V graph for a capacitor:



- (a) Capacitance
- (b) Energy
- (c) Energy density
- (d) Pressure
- 18. In the relation Q=CV, which graph correctly describes the relation between "C" and "V" when there is air as dielectric between capacitor plates:



- (c)
- (d)
- 19. If mica sheet is placed between the plates of capacitor, the capacity will:

(a) Increase

- (b) Remain same
- (c) Decrease
- Become zero (d)

- 20. Ohm x farad is equivalent to: (a) Second
- (c) Weber
- (d) Tesla
- (b) Henry 21. The distance between the plates of a parallel plate capacitor is 4.0 mm and area of each plate is 8m2. The plates are in a vacuum. What is the capacitance of capacitor?
  - (a)  $1.7 \times 10^{-8} \text{ F}$
- (b) 8.85 x 10° F
- (c) 3.4 x 10⁻⁹ F
- (d) 9.0 x 10⁻⁹ F
- 22. The ratio of the capacitance of capacitor with a given material to the capacitance of the same capacitor when the medium is vacuum is termed as:
  - (a) Permittivity of free space

(b) Specific inductive capacity

(c) Dielectric constant

(d) Energy stored

| Sr.  | 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. 22. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| Ans: | b   | d   | d   | c   | a   | a   | a   | c   | a   | a   | a c     |

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23. Capacity of a capacitor depend upon?

(a) Size of plates

(a) E=F/q

- (d) All of these
- (b) Nature of dielectric between the plates
- (c) Distance between the plates (c) Distance better the place of instantaneous charge and maximum charge on plates of capacitor at t=RC is (during the place).
- discharging of capacitor):
  - (b) 99.3 %
- (c) 63 %

(c) E=F/3a

(d) 3.25 %

(d) 8 kV

(d) Coulomb / meter

(d) None of these

(d) Volt

- 25. Formula for electric field intensity is
  - (b) E=3F/2q

(d) None of them

- 26. The electron volt is the unit of (a) Electric current (b) Electric potential (c) Electric energy (d) (a) Electric flux Q at a potential difference  $\Delta V$ . What happens if the voltage applied to Q and Q are the a battery is doubled to Q  $\Delta V$ ?
  - the capacitor by a battery is doubled to  $2 \Delta V$ ?
  - (a) The capacitance falls to half its initial value, and the charge remains the same

**ELECTROSTATICS** 

- The capacitance and the charge both fall to half their initial values
- (c) The capacitance and the charge both double
- (d) The capacitance remains the same, and the charge doubles
- (d) The capacitor is 24 J. What is the potential difference between 28. The energy stored in a parallel plate capacitor is 24 J. What is the potential difference between
- the plates if the capacitance of the capacitor is 3  $\mu$ F?
- (b) 54 kV (a) 4 KV (c) 16 kV 29. The ratio gravitational force to electric force is always:

  - (a) Greater than unity
- (b) Less than unity (d) Zero
- (c) Equal to unity 30. Electric potential difference between the two points can be defined as:...
  - (a) Difference of the kinetic energy per unit charge
  - (b) Difference of the kinetic energy
  - (c) Difference of the potential energy per unit charge
  - (d) Difference of the potential energy
- 31 The SI unit of electric intensity is:
  - (a) Volt / meter (b) Newton / meter
- 32. The SI Unit of electric charge is:
- (a) Coulomb (b) Ampere
- 33. E=F/q is the formula for?
  - (a) Electrical field strength (c) Both of them
- (b) Electrical field intensity None of them

(c) Tesla

(c) Hertz

- 34. The charge on electron is equal to
  - (a) Proton (b) Two protons (c) Two neurons
- 35. The capacitance of a capacitor is a measure of its ability to: (a) Store charge (b) Store electric field
  - (c) Gain potential difference
- 36. Electric field at a point varies as  $r^0$  for:
- (a) A plane infinite sheet of charge
- (c) Electric dipole
- 37. Coulomb's law is only applicable for:
- (b) A point charge
- (d) Line charge of infinite length

(d) Store magnetic field

- (a) Big charges
- 38. Electric intensity at the centre of uniformly distributed charged sphere is:
  - (c) a/2
- (d) Any charges (d) q/ε₀
- 39. The value for er for air is: (b) Ka/r2

| r. 23           | 24  |     |     | (b) | 1.06 |     |     | (c  | ) 1. | 006 |     |     | (d) | 1.00 | 06  | -   |
|-----------------|-----|-----|-----|-----|------|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|
| r. 23.<br>Is: d | 24. | 25. | 26. | 27. | 28.  | 29. | 30. | 31. | 32.  | 33. | 34. | 35. | 36. | 37.  | 38. | 39. |
| 14              | a   | a   | c   | d   | a    | b   | С   | a   | a    | С   | a   | b   | a   | С    | a   | d   |

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40. Force acting on a positive charge is always:

- (a) In the direction opposite to electric field
- (b) In the direction of electric field
- (c) In the direction of perpendicular to electric field
- (d) In the direction perpendicular to the velocity of charges

41. A particle carrying a charge 3e, accelerates through a potential difference of 2V. The energy acquired by it is:

- (a) 6eV
- (b) 1.5eV
- (c) 0.66eV
- (d) 12eV

42. Electric potential difference can be defined as:

- (a)  $\Delta V = \Delta U q$
- (b)  $\Delta V = \Delta U/a$
- (c)  $\Delta V = \Delta U + a$
- (d)  $\Delta V = \Delta U *_0$

43. A proton has mass m and charge q. It is suspended in electric and gravitational field. What is the magnitude of electric field?

- (a) E = mg/q
- (b) E = mg/qv
- (c) E = mg/qvB
- (d) E = q/mg

44. A charge of 2 C placed in electric field of 10 N/C what will be the work done in moving charge a distance of 5 m:

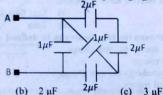
- (a) 100 J
- (b) 50 J
- (c) 150 J

45. Two charges of equal magnitude and at a distance r exerts a force F on each other. If the charges are halved and distance between them is doubled, then the new force acting on each charge is: (a) F/8

(b) F/4

(c) 4 F

46. The total capacity of capacitors shown in the adjoining figure between the points A and B is:



(a) 1 uF

- 2.0 m². The plates are in a vacuum. A potential difference of 1.0 x 10⁴ V is applied across the plates. Find the capacitance. (b) 3.54 x 10⁻⁹ F

  - (c)  $-8.85 \times 10^{-9} \text{ F}$
- (d) 9.0 x 10⁻⁹ F

(d) 4 µF

48. If the length, width and separation between the plates of a parallel plate capacitor is doubled then its capacitance becomes:

47. The distance between the plates of a parallel plate capacitor is 2.0 mm and area of each plate is

(a) Double

(a)  $4 \times 10^{-3} F$ 

- (b) Half
- (c) Four-times
- (d) Eight-times

49. The formula for electric field strength is 'E=F/Q', where E is electric field strength and F is force and Q is charge. Which one of the following options gives the correct base units for electric field strength?

- (a) kgms⁻²A⁻¹
- (b) kgs⁻²A⁻³
- (c)  $kg^2m^{-2}s^{-3}A$

50. For a heat engine 'A' ratio of Q2 to Q1 is 2/3 while that of heat engine 'B', ratio of Q2 to Q1 is 1/3. What is the value  $\eta_A : \eta_B$ ?

- (a) 1:3 (b) 2:3 (c) 1:2 (d) 2:1

|      | A Charles | ELF 931 |     |     |     |     |     |     |     | -   |     |
|------|-----------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Sr.  | 40.       | 41.     | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. |
| Ans: | b         | a       | b   | a   | a   | d   | b   | c   | a   | a   | С   |

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UNIT 07 >>

# **CURRENT ELECTRICITY**

## PRACTICE TEST NO. 1

1. Two unequal resistances are connected in parallel across a battery. Which of the following statement is true?

CURRENT ELECTRICITY

- (a) Same current will flow through both resistance
- (b) Current through smaller resistance is higher
- Current through larger resistance is higher (c)
- (d) Current can be higher in any resistance depending on emf of the cell

2. Three resistors of 2,3 and  $5\Omega$  are connected in the form of a triangle. If a battery of 2.5 V is connected across  $5\Omega$  resistor, then the current passing through  $3\Omega$  will be:

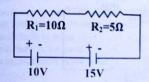
(b) 0.25 A

(c) 0.5 A

(d) 0.75 A

(a) 1A 3. A 50 V battery is connected across a 10 ohm resistor. The current is 4.5 amperes. The internal resistance of the battery is:

- (a) Zero
- (b) 0.5 ohm
- (c) 1.1 ohm
- (d) 5 ohm
- 4 In the diagram shown, the current through the resistor will be:



(a) = A clockwise

(b)  $\frac{3}{2}A$  clockwise

(c)  $\frac{1}{2}A$  anticlockwise (d)  $\frac{5}{2}A$  anticlockwise

5. Two wires of same material have length L and 2L and cross-sectional areas 4A and A respectively. The ratio of their specific resistance would be:

(a) 1:2

(b) 8:1

(d) 1:1

6. An electric bulb of 100 watt is connected to a supply of electricity of 220V. Resistance of the

(a) 484 Ω (b) 100 Ω

(c) 22000 Ω

7.  $62.5 \times 10^{18}$  electrons per second are flowing through a wire of area of cross-section  $0.1 \text{ m}^2$ , the value of current flowing will be: (a) 1A

(b) 0.1 A

8. You are given three bulbs of 25, 40 and 60 watt. Which of them has lowest resistance:

(d) 0.11 A (d) Insufficient info

(a) 25 watt bulb (b) 40 watt bulb 9. The resistance of a conductor is 5 ohm at 50°C and 6 Ohm at 100°C, the resistance at 0°C is:

10. A current of 1 mA is flowing through a copper wire. How many electrons will pass a given point

(a)  $6.25 \times 10^{19}$ 

(b)  $6.25 \times 10^{15}$ 

(c)  $6.25 \times 10^{31}$ 

(d) 6.25 x 10⁸

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11. The example for non-ohmic resistance is:

(a) Copper wire

(b) Filament bulb

(c) Diode (d) Both b and c

12. An expression for rate of heat generated, if a current of I ampere flow through the bulb is:

(b) 1²R

(c)  $V^2R$ 

(a) I²Rt 13.  $\sigma_1$  and  $\sigma_2$  are electrical conductivities of Ge and Na respectively. If these substances are heated

(a) Both  $\sigma_1$  and  $\sigma_2$  increase

(b)  $\sigma_1$  increases and  $\sigma_2$  decreases

(c)  $\sigma_1$  decreases and  $\sigma_2$  increases

(d) Both  $\sigma_1$  and  $\sigma_2$  decreases

14. Five cells, each of emf E and internal resistance 'r', are connected in series. If by mistake one the cells is connected wrongly, the equivalent emf and internal resistance of the combination are?

(a) 5E, 5r

(b) 3E, 3r

(c) 5E, 3r

15. Four identical cells each having an emf of 12V, are connected in parallel. The electromotive force of the combination is:

(a) 48 V

(b) 12V

(c) 4V

16. A student has 10 resistors of resistance 'r'. The minimum resistance made by him from given resistors is:

(a) 10 r

17. 20µA current flows for 30 s in a wire, transfer of charge will be:

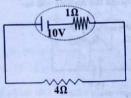
(a) 2 x 10⁴ C

(b)  $4 \times 10^{4} \text{ C}$ 

(c) 6 x 10⁻⁴ C

(d) 8 x 10⁻⁴ C

18. In the circuit shown, the rate of energy dissipation in the battery is:



(a) 2W

(b) 6 W

(c) 4W

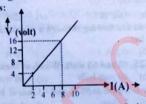
19. The resistance of hot tungsten filament is about 10 times more than the resistance of cold tungsten filament. What will be the resistance of 100 W and 200 V lamp when hot in use?

(a) 40 Ω

(b) 400 Ω

(c) 200 Ω

20. Variation of current and voltage in a conductor has been shown in the diagram below, The resistance of the conductor is:



(a) 4 ohm

(b) 2 ohm

3 ohm

(d) 1 ohm

21. The current in a resistor is 12.0 mA. What charge flows through the resistor in 0.020 s?

(b) 2.4 Mc

(c) 0.24 mC

(d) 0.40 mC

(a) 0.16 mC at 80°C is  $(\alpha = 0.004041^{\circ}C^{\circ})$ :

| 22. A cop<br>(a) | ) 264. |     |     |     | 5.45Ω | its resis |     | .64.65Ω |     | (d) | 325.45 kH    |
|------------------|--------|-----|-----|-----|-------|-----------|-----|---------|-----|-----|--------------|
| Sr.              | 11.    | 12. | 13. | 14. | 15.   | 16.       | 17. | 18.     | 19. | 20. | 21.          |
| Ans:             | d      | b   | b   | d   | b     | b         | c   | c       | a   | b   | 0336-7098894 |

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UNIT 07

23. A steady current flow in metallic conductor of non-uniform cross-section. The quantity / A steady current along the length of the conductor is /are; quantities constant along the length of the conductor is /are;

(a) Drift velocity only

(b) Current and drift speed

**CURRENT ELECTRICITY** 

(d) Current only

(c) Current, drift velocity and drift speed (c) Current, drift votes  $1 \times 10^{-7}\Omega$ . The resistance of an iron wire of particular length and 14. The resistivity of iron is  $1 \times 10^{-7}\Omega$ . If both the length and the diameter of wire are doubled the The resistivity of Iron the length and the diameter of wire are doubled, then the resistivity in  $\Omega$ 

m will be:

(b) 2 x 10⁻⁷

(c) 4 x 10

(a) 1 x 10⁻⁷ (a)  $1 \times 10^{-7}$  (d)  $8 \times 10^{-7}$  25. A potential difference V is applied to a conductor of length  $\ell$  and radius r. When potential

difference is doubled, the drift velocity is: (b) Unchanged

(a) Halved

(c) Doubled

(d) Quadrupled

26. Read the following statements: Y: The resistivity of a semiconductor decrease with increase of temperature

Y: The resistance of collisions between free electrons and ions increase with increase of temperature.

Select the correct statement(s) from the following:

(a) Y is true but Z is false

(b) Both Y and Z are true

(c) Y is false but Z is true

(d) Y is true and Z is the correct reason for Y.

27. Terminal potential difference and electromotive force:

(a) Have same units

(b) Always have same values

(c) Have different units

(d) Always have different values

28. The four bulbs of 60 W each are connected in series and a battery is connected across their combination. Which of the following statement is true?

(a) Current through each bulb is same

Voltage across each bulb is not same

(c) Power dissipation in each bulb is not same

(d) All of these

29. A unit of electricity is usually equal to:

(a) One kilowatt

(b) One watt minute

(c) One kilowatt hour

(d) One joule hour

30. A battery of four cells in series, each having an emf of 1.4 V and an internal resistance of  $2\Omega$ , is to be used to charge a small 2 V accumulator of negligible internal resistance. The charging current

(a) 0.1 A

(b) 0.2 A

(c) 0.3 A

(d) 0.45 A

31. You have three appliances, each of 500 W, running on 220 V a.c: (i) an electric lamp, (ii) an electric iron (iii) an electric room heater. The electrical resistance is: (a) Maximum for electric lamp

(c) Maximum for the heater

(b) Maximum for electric iron (d) Same for all

32. In the short circuit, current is (a) Zero, infinite

and in the open circuit, resistance is

33. Which statement describes the electrical potential difference between two points in a wire (c) Infinite, infinite (d) Infinite, zero

(a) The force required to move a unit positive charge between the points

The ratio of the energy dissipated between the points to the current The ratio of the power dissipated between the points to the current

The ratio of the power dissipated between the points to the charge moved

| Ans: d 24. | 25. | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33. |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| DEMPRIME   | C   | b   | a   | a   | c   | d   | d   | С   | c   |

| UNIT 07                                                | CUR       | RENT ELECT                                | RICITY      |                     |         | Zayan Publish         |
|--------------------------------------------------------|-----------|-------------------------------------------|-------------|---------------------|---------|-----------------------|
| 34. A cell of internal resistan                        | ce 2.0Ω   | and electromo                             | tive force  | (e.m.f) 1.5 V is co | nnecte  | d to a resistor.      |
| resistance 3.0Ω. What is                               | the pote  | ential difference                         | e across in | iternar resistor.   |         |                       |
| (a) 5                                                  | (b)       | 0.9                                       | (c)         | 1.2                 | (d)     | 0.6                   |
| 35. Which of the following u                           | nits are  | equivalent?                               | (A) (A      | 2 (CV e-1)          | (4)     | (4.20                 |
| (a) (A) and (C s)                                      | (b) (     | $A \Omega$ ) and $(JC)$                   | (c) (A      | a open circuit is 2 | 2 volt  | (A V) and (W s        |
| 36. The potential difference of 5 ohm across the term  | between   | n the terminals                           | ninal poter | ntial difference is | 1.8 vol | t. The int            |
| pagistamas of the pall is:                             |           |                                           |             |                     |         |                       |
| (a) $\frac{9}{10}$ ohm  37. The resistor of resistance | (b)       | 10 ohm                                    | (c)         | $\frac{7}{2}$ ohm   | (d)     | $\frac{12}{2}$ ohm    |
| (a) 10 onth                                            | D in a    | onnected to 25                            | V supply.   | rate of heat produ  | uced in | it is 25 T            |
| value of R is:                                         | e K is co | onnected to 25                            | · suppoy,   | California          |         | 1 13 23 J 8 . T       |
| (a) 225 O                                              | (b)       | 50 Ω                                      | (c)         | 25 Ω                | (d)     | 125 Ω                 |
| 38. A heating coil has a resis                         | stance o  | of 20Ω. It is des                         | igned to o  | perate on 220 V.    | What e  | lectric energy i      |
| joules is supplied to heat                             | ter in 10 | 0 s?                                      |             |                     |         |                       |
| (a) 2420 J                                             | (b)       | 242000 J                                  | (c)         | 24.2 kJ             | (d)     | 2.4 MJ                |
| 39. Ohm's Law is applicable                            | e only v  | vhen temperati                            | ire remair  | Constant            | (L)     | N                     |
|                                                        | (b)       | Absolute zero                             | (c)         | Constant            | (a)     | None of these         |
| 40. Electric power is  (a) Rate of electric v          | work do   | ne per unit time                          | (b)         | Voltage per unit    | time    |                       |
| (c) Electric charge p                                  | er unit t | time                                      | (d)         | Current per unit    | ime     |                       |
| 41. When bulb is turned on                             | . ohm's   | law is applical                           | ole         |                     |         |                       |
| (a) Vec                                                | (b)       | No                                        | (c)         | Partly              | (d)     | None of these         |
| 42. The temperature coeffic                            | cient of  | resistance is ex                          | pressed in  | it can are fine W   | to to a | died ruch all         |
| (a) °C                                                 | (b)       | °C-1                                      | (c)         | m°C-1               | (d)     | None of these         |
| 43. 4000 Coulomb charges                               | were p    | passing from th                           | ne wire to  | r about 12 secon    | us. Est | imate the curr        |
| during this process?                                   | (b)       | 666 67 amper                              | ė (c)       | 333.33 volts        | (d)     | None of these         |
| (a) 333.3 ampere<br>44. Internal resistance is the     | e resist  | ance offered by                           | (0)         |                     | 52 di   |                       |
| (a) Source of emf                                      | (b)       | Conductor                                 | (c)         | Resistor            | (d)     | Capacitor             |
| 45. Electric current may be                            | define    | d as                                      |             | 1                   |         |                       |
| (a) Rate of flow of                                    | charge    |                                           | (b)         | Rate of flow of r   | noment  | um                    |
| (a) Data of flow of                                    | nower     | No. of Street, or other party of the last | (d)         | None of them        | aniatar | oo & ohms and         |
| 46. A current of 16 amper                              | es divid  | des between tw                            | o branch    | es in parallel of i | esistai | ice o onnis and       |
| ohms respectively. The                                 | curren    | t in each branc                           | n is:       | 4.6 A, 6.9 A        | (d)     | 4.6 A, 9.6 A          |
| (a) 6.4 A, 6.9 A                                       | (b)       | 6.4 A , 9.6 A                             | (0)         | The samples of      | alactro | ns per second         |
| 47. If a current of 5 amper                            | res flow  | s through the                             | conductor   | . The number of     | electro | ins per               |
| is:<br>(a) 1.0x10 ⁻¹⁹                       | (6)       | 2 12-1019                                 | (c)         | 4×10 ¹⁹  | (d)     | 7.68x10 ²⁰ |
| (a) 1.0x10.19<br>48. What is the power of a            | bulb if   | it is operated a                          | t 220V an   | d the current in t  | he circ | uit is 1.5 Amp.       |
| (a) 330 watt                                           | (h)       | 430 watt                                  | · (C)       | 330 Wall            | (4)     | 500 watt              |
| 49. Maximum power is del                               | ivered    | when internal                             | resistance  | of the source equi  | als:    | -C these              |
| (a) Zero resistance                                    | (b)       | Load resistan                             | ice (c)     | Max resistance      | (d)     | None of these         |
| 50. 1 kilo ohm = o                                     | hm        |                                           |             | Address to do       | (d)     | None of these         |
| (a) 10 ³ ohm                                | (b)       | 10 ² ohm                       | (c)         | 10 ⁴ ohm | (d)     | None of sale          |
| TO THE REAL PROPERTY AND ADDRESS OF                    |           |                                           |             |                     |         |                       |
|                                                        |           |                                           |             |                     |         |                       |

|    | Sr.<br>Ans: | 34.<br>d | <b>35.</b> b | <b>36.</b> b | <b>37.</b> c | <b>38.</b> | <b>39.</b> c | <b>40.</b> a | <b>41.</b> b | <b>42.</b> b | а | a | a    | D  | D    | a   |    | <b>50.</b> a |
|----|-------------|----------|--------------|--------------|--------------|------------|--------------|--------------|--------------|--------------|---|---|------|----|------|-----|----|--------------|
| A. | IDCAT PR    | ED D     | OOk          |              |              |            |              |              | 334          |              |   | R | v A7 | HA | R IO | BAL | 03 | 36-709       |

| -07           | The second second                                                 |        | RRENT ELEC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |             |                            | The same of | Zayan Publishe    |
|---------------|-------------------------------------------------------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------|-------------|-------------------|
| UNIT 07       |                                                                   |        | RACTICE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |                            |             |                   |
|               | has a resistance of $y(\alpha)$ of the mater                      | £ 5.55 | 2 at 19°C and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 21.5 Ω at   | 200°C. Find th             | e tempo     | MAN BEE           |
| wire          | has a resistance of $y(\alpha)$ of the mater $0.016$ per degree ( | ial.   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | t in a til                 | temper:     | ature coefficient |
| . A sistivi   | 0.016 per degree                                                  | Celsiu | s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (b)         | 32 per degree              | Celsine     |                   |
|               |                                                                   |        | S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (4)         | 0.00106                    |             | ei                |
| (c)           | 0.018 per degree                                                  | necte  | d in parallel ac                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | cross 200   | V supply line.             | If one but  | harter .          |
| Four 10       | 0.018 per degree 0<br>0 W bulbs are cor<br>No bulb will light     |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)         | All the four b             | ulbs will I | ight lused        |
| (a)           | Rest of three bulbs                                               | s will | light                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (d)         | Both b and c               | 0103 WIII I | ight              |
| (c)           | Rest of times out                                                 |        | The state of the s |             |                            |             |                   |
| SI unit       | Coulomb                                                           | (b)    | Volts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (c)         | Ampere                     | (d)         | Newton's Mete     |
| (a)           | . 1 1:660                                                         | mance  | is required for                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | establish   | ing steady cur             | rent?       | rewion's Mete     |
| How mu        | Minimum                                                           | (b)    | Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (c)         | Constant                   | (d)         | Varying           |
| (a)           | of the followin                                                   | g bull | bs has the least                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | resistano   | e?                         | (3)         | , any mig         |
| Which o       | 100W                                                              | A Y    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)         | 300W                       |             |                   |
| (60)          |                                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (d)         | 60W                        |             |                   |
| (-)           | . I madine of                                                     | cert   | ain wire are do                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ubled sin   | ultaneously, tl            | hen the re  | sistance will:    |
| The leng      | th and radius of a                                                | louble | ed and specific r                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | esistance   | will be halved             |             |                   |
|               |                                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                            | anged       |                   |
| ALL T         | existance Will De I                                               | arved  | and the specific                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | resistanc   | e will be double           | ed          |                   |
| (A) D         | ecictance and spec                                                | HIC re | esistance will be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ith remain  | uncharged                  |             |                   |
| Why sho       | uld a resistance b                                                | e intr | oduced in a cir                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | cuit in se  | ries deliberate            | ly?         |                   |
| (a)           | To increase curren                                                | t      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)         | To decrease c              | urrent      |                   |
| (c)           | To control current                                                | No.    | CONTRACTOR OF THE PARTY OF THE  | (d)         | Just to give a             | good look   | to the current    |
| Steady c      | urrent does not cl                                                | nange  | with respect to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                            |             |                   |
| (0)           | Conductor                                                         | (b)    | Source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (c)         | Time                       | (d)         | Potential         |
| of the second |                                                                   | 100    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | of the first of the second | (-)         | difference        |
| Six lamp      | s of 40 watts each                                                | work   | cing for 4 hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | per day     | will consume_              | ene         | rgy in a month:   |
| (a)           | 28.8 kWh                                                          | (b)    | 22.8 kWh                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (c)         | 38 8 kWh                   | (d)         | 33.8 kWh          |
| ). A solder   | ing iron draw 7.5                                                 |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | What is i   | its wattage ratt           | ing?        |                   |
|               | 563                                                               | (b)    | 763                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (c)         | 663                        | (d)         | 863               |
| . The tern    | inal potential diff                                               | feren  | ce of a cell when                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | n open cir  | cuited is (when            | re "E" is   | emf of cell):     |
| (a)           | E . Was a local                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (c)         | F                          | (d)         | E                 |
| . When th     | ree identical bulb                                                | e of 6 | W 200 V roti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |             |                            |             | OV sumply the     |
| power di      | awn by them will                                                  | he.    | VV, 200 V Tati                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ng are co   | inected in seri            | es to a 20  | o v suppry, the   |
| (a)           | 60 W                                                              | (1-)   | 10 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (a)         | 180 W                      | (d)         | 20 W              |
| . A device    | which converts no                                                 | on-ele | etrical anarmy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | nto elect   | rical anamaria             | (u)         | 20 W              |
|               |                                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | Transformer                | caneu:      |                   |
| (c)           | Source of the                                                     | enerov | ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 19.24       |                            |             |                   |
| - ac tale     | at which electrics                                                | I ana  | www.in name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (u)         | ther form is               | Had.        |                   |
|               |                                                                   | · chel | gy is converted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)         | Electric na                | mea:        |                   |
|               |                                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             | Electric power             |             |                   |
| " W 100-M     | bull and a 25 xx                                                  | hull   | are designed 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (a)         | Electromotive              | lorce       | monte of the      |
| same len      | bulb and a 25-W<br>gth and material.                              | The -  | are designed to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | r the sam   | e voltage. They            | to that of  | the 25-W hulb     |
| R:            | IN STREET WAS BOOK IN                                             | ne r   | and of the dian                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | neter of th | ie 100-W bulb              | to that of  | the 25-17 build   |
|               |                                                                   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                            |             |                   |
| (a) ¿         | 1:1                                                               | (6)    | 2.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |             | =                          | (1)         | 1.2               |
| (a) 4         | 1:1                                                               | (b)    | 2:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (c)         | √2:1                       | (d)         | 1:2               |

(c) R

22.

(d) 2R

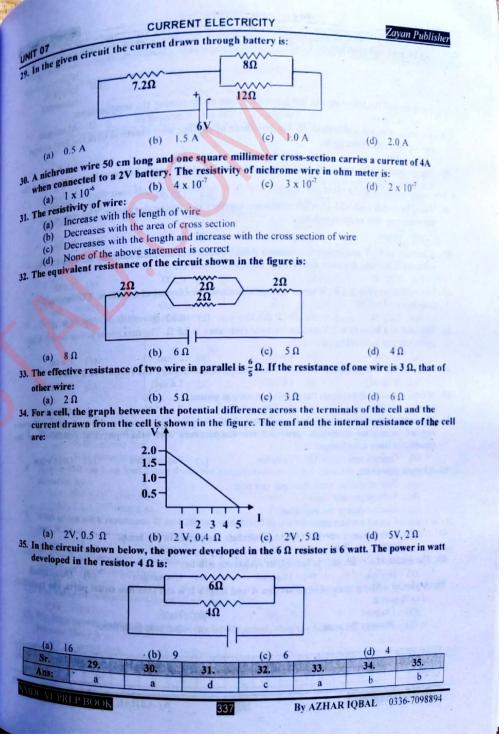
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wire will be:

(b)

19.

20.



36. Two bulbs one of 50 watt and another of 25 watt are connected in series the mains. The ratio of the currents through them is:

(a) 2:1

(b) 1:2

(c) 1:1

Without voltage (d) cannot be calculated

37. For which of the following the resistance decreases on increasing the temperature:

(a) Copper

(b) Tungsten

(c) Germanium

(d) Aluminum 38. A certain wire has a resistance R. The resistance of another wire identical with the first except having twice its diameter is:

(a) 2 R

(b) 0.25 R

(c) 4 R

(d) 0.5 R

39. The resistance of a wire is 20 ohm. It is so stretched that the length becomes three times, then the new resistance of the wire will be:

(a) 6.67 ohm

(b) 60 ohm

(c) 120 ohm

(d) 180 ohm

40. Three resistors each of 2 ohm are connected together in a triangular shape. The resistance between any two vertices will be:

(a) <del>4</del>ohm

(b)  $\frac{3}{2}$ ohm

(c) 3 ohm

41. A battery of 10 V and internal resistance 0.5Ω is connected across a variable resistor R. The value of R for which power delivered is maximum equal to:

(b) 1.0 Ω

(c) 0.5 Q

42. The emf of a cell is 1.5 V. When it is short circuited, the current of 6A flows. The internal resistance of cell is:

(a) 0.25 Ω

(b) 0.75 Ω

(c) 0.50 Ω

(d) 1.0 Ω

43. The emf of a battery is 2 V and its internal resistance is 0.5 Ω. The maximum power which it can deliver to any external circuit will be:

(a) 8 watt

(b) 4 watt

(c) 2 watt

(d) 1 watt (d) 0.40 mC

44. The current in a resistor is 8.0 mA. What charge flows through the resistor in 0.020 s? (b) 4.0 mC

(a) 0.16 mC

45. Which equation represents the maximum output power (b)  $P = I^2 R$ 

(c) 1.6 mC (c)  $P = V^2/R$ 

(d) All of these

46. The current passing through a conductor is directly proportional to the potential difference applied across its terminals, provided the temperature and other physical conditions of the conductor does not change:

(a) Gauss's law

(a) P = VI

(b) Lenz law

(c) Pascal's law

(d) Ohm's law

47. Electric power is:

(a) Rate of electric work done per unit time

(b) Voltage per unit time

(c) Electric charge per unit time

(d) Current per unit time

48. A 250V bulb passes a current of 0.3A. Calculate the power in the lamp.

(a) 50W (b) 75W (c) 100 W

(d) 990W

49. The length of a conductor is halved, its resistance will be:

(a) Halved

(c) Unchanged

(d) Quadrupled

(b) Doubled 50. A wire of uniform area of cross-section A and length L is cut into two equal parts, the resistivity of each part is

(a) Doubled

(c) Remains the same

(b) Half

(d) Increase three times

| Sr.  | 36. | 37. | 38. | 39. | 40. | 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. 49. 50. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|
| Ans: |     | c   | b   | d   | a   | c   | a   | c   | a   | d   | d   | a   | b a c       |

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## PRACTICE TEST NO. 3

CURRENT ELECTRICITY

In the following circuit, the resistance between points X and Y is:  $10\Omega$ 10Ω  $20\Omega$  $10\Omega$ 

(b) 100 Ω

(c) 15 Ω

(d) 5.1Ω

2.  $1 \times 10^7$  electrons pass through a conductor in 1 $\mu$ s. The current in (mA) through the conductor is: (b)  $1.6 \times 10^{-3}$ (c) 1.6x10⁻⁴

(a) 1.6x10⁻⁶

(d) 1.6x10-5

3. The internal resistance of a cell can be expressed:

(d) E - 1

4. The terminal potential difference of a cell of emf E when short circuit is:

(a) E

(c) Zero

5. The quantity of charge required to provide a current of 10A for 1 hour is:

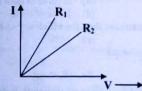
(a) 3600 C

(b) 360 C

(c) 36000 C

(d) 360000 C

6. I-V graph for two different resistors is shown in the figure below then:



(a)  $R_1 > R_2$ 

(b)  $R_1 < R_2$ 

(c)  $R_1 = R_2$ 

(d)  $R_1 = 2R_2$ 

7. When the length and area of cross-section both are doubled, then its resistance:

(a) Will become half

(c) Will remains same

(b) Will be doubled

(d) Will become four times 8. A wire 100 cm long and 2 mm diameter has a resistance of 0.7 ohm, the electrical resistivity of the material is:

(a) 4.4 x 10⁻⁶ ohm x m (c) 1.1 x 10⁻⁶ ohm x m (b)  $2.2 \times 10^{-6}$  ohm x m

(d) 0.11 A 9. Two wires with resistance R and 2R are connected in parallel, the ratio of heat generated in 2R

(a) 1:2

(b) 2:1

10. Two bulb are working in parallel order. Bulb A is brighter than bulb B. If  $R_A$  and  $R_B$  are their

resistance respectively then: (a)  $R_A > R_B$ 11. The value of internal resistance of an ideal cell is:

(d) None of these

12. If a high power heater is connected to electric mains, then the bulb in the house become dim,

| (a) Current drop | (b) Po | tential d | rop | (c) N | lo curren | t drop | (d) | No pote | ntial dro |
|------------------|--------|-----------|-----|-------|-----------|--------|-----|---------|-----------|
| MS: b 3.         | 4.     | 5.        | 6.  | 7.    | 8         | 9.     | 10. | 11.     | 12.       |
| aC               | c      | c         | b   | c     | b         | Ь      | b   | a       | b.        |

(b) 4.0 Ω

(c) 2.0 Ω

23. A piece of wire of resistance 4Ω is bent through 180° at its mid-point and the two halves are

twisted together. Then the resistance is: (c) 20 (a) 8Ω

24. The electric resistance of a certain wire of iron is R. If its length and radius are both doubled,

(a) The resistance will be halved and the specific resistance will remain unchanged

(b) The resistance will be halved and the specific resistance will be doubled

(c) The resistance and the specific resistance will both remain unchanged

(d) The resistance will be doubled and the specific resistance will be halved

25. A wire has resistance 16Ω. It is bent in the form of a circle. The effective resistance between the two points on any diameter of the circle is:

(a) 4Ω

(b) 32Ω

(c) 10Ω

(d) 24Ω

24. 25. 19. 20. 21. 22. 23. 15. 16. 17. 18. Ans: By AZHAR IQBAL 0336-7098894

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**CURRENT ELECTRICITY** UNIT 07 26. Two resistors of 15 $\Omega$  and 30 $\Omega$  are connected in parallel. What should be the value of R to be connected in series with the other two so that the net resistance will be  $20\Omega$ ? (d) 120Ω (c) 15Ω (b) 10Ω (a) 5Ω 27. In SI unit, J C' equal to: (d) Joule (c) Newton (b) Pascal (a) Volt 28. A 50 W bulb is connected in series with a room heater. If now 50 W bulb is replaced by 100 W hulb. The heater output will: (d) Heater will burn out (a) Increase (c) Decrease (b) Remain same 29. If the power company sells electrical energy at Pkr 18/kWh, how much does it cost to run 100 W power for 3 hours: (d) Pkr 2.5 (a) Pkr 5.4 (b) Pkr 8.8 (c) Pkr 6.7 30. A 2 kW boiler used for 1 h energy per day consumes the following electrical energy in 30 days: (d) 80 units (a) 60 units (b) 120 units (c) 15 units 31. The effective wattage of 100 W, 60 W and 40 W lamps connected in series, is equal to: (a) 200 W (d) 19.3 W (b) 124 W (c) 47.8 W 32. A battery has an emf of 24 V and an internal resistance of 2.5 Ω. When an external 5.5Ω resistor is connected across the terminals of the battery, the potential difference between the terminals (a) 12.5 V (b) 13.5 V (c) 18.5 V (d) 16.5 V 33. A total charge of 100 C flows through a 12 watt bulb in a time of 50 second. What is the potential difference across the bulb during this time? (a) 0.12 V (b) 6.0 V (d) 24 V (c) 2.0 V 34. Two bulbs one of 35 W, 220 V and other of 70 W, 220 V are connected in parallel across the mains of 220 V. The current: (a) In 35 W bulb is lesser (b) Is same in both bulbs (c) In 70 W bulb is lesser (d) None of these 35. Which of the following expression is true? (a) 1 watt =  $(1 \text{ ohm}) \times (1 \text{ ampere})$ (b) 1 watt = (1 volt) x (1 ampere) (c)  $1 \text{ watt} = (1 \text{ ohm}) \times (1 \text{ volt})$ (d) 1 watt =  $(1 \text{ ampere}) \times (1 \text{ ohm})^2$ 36. The amount of energy obtained by a source with power of 1 kilowatt in one hour is equal to one: (a) Kilowatt hour (b) Electron volt (d) Calorie (c) Joule 37. Find the resistance of voltage of the circuit is 45 volts and current 30 Amp? (a) 1.6 ohm (b) 1.5 ohm (c) 1.7 ohm (d) 1.8 ohm 38. Which of the following can have negative temperature coefficient? (a) Compounds of silver (b) Liquid metals (c) Metallic alloys 39. Four wires of same material, the same cross-sectional area and the same length when connected in parallel give a resistance of 0.25 ohms. If the same four wires are connected is series the effective resistance will be (c) 3 ohm (d) 4 ohm

(a) 1 ohm (b) 2 ohm 40. Volts / Ampere =

(d) None of these

(a) Ohm (b) Pascal (c) Ohm meter 41. A 200 W bulb operates in a 220V circuit. Find the current.

(c) 0.6 Amp

(d) 3 Amp

(b) 2 Amp 42. If I, R and t are the current, resistance and time respectively, then according to Joule's law heat produced will be proportional to (a) I²Rt (b) 12Rf

43. SI unit of resistivity is

(a) 0.9 Amp

(c) I2R2t

(d)  $I^2R^2t^2$ 

(a) Ohm (b) Ohm meter (c) Ohm/meter (d) Meter/ohm Sr. 26, 27, 28, 29, 30. 31. 32. 33. 34. 35. d d

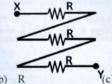
44. The resistance of a superconductor is:

(a) Finite

(b) Infinite

(d) Changes with every conductor (c) Zero

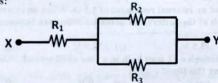
45. Three resistors each having value 'R' are connected as shown in figure. What is the equivalence resistance between 'X' and 'Y'?



(a) 3R

R/3

46. Three resistors of resistance R1, R2 and R3 are connected as shown in figure. Equivalence resistance is:



(a)  $R_1+R_2+R_3$ 

(c)  $R_1R_2+R_2R_3+R_2R_3$ 

47. The length and radius of an electric resistance of a certain wire are doubled simultaneously, then the:

Resistance will be doubled and specific resistance will be halved

Resistance will be halved and specific resistance will remain unchanged

Resistance will be halved and the specific resistance will be doubled (c)

(d) Resistance and specific resistance will both remain uncharged

48. Resistivity of a wire is ohm-m if 0.75 A current flows through it by applying 1.5 V potential difference, take length and cross section as 5m and  $2.5 \times 10^{-7}$  m²:

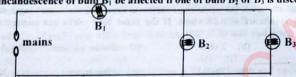
(a)  $1 \times 10^{-7}$ 

(b)  $2.63 \times 10^{-8}$ 

(c)  $19 \times 10^{-8}$ 

(d)  $7.85 \times 10^{-8}$ 

50. Three bulbs B1, B2 and B3 are connected to the mains as shown in the figure given below. How will the incandescence of bulb B1 be affected if one of bulb B2 or B3 is disconnected from the circuit?



(a) no change in incandescence

(b) Bulb B1 will become brighter

(c) Bulb B1 will become less bright

(d) Bulb B2 will become less bright

50. The resistance of a conductor at absolute zero (0 K) is:

(a) Almost zero

Almost infinite

(c) No prediction at all

(d) May increase or decrease

| - | Sr.  | 44. | 45. | 46. | 47. | 48. | 49. | 50. |
|---|------|-----|-----|-----|-----|-----|-----|-----|
| A | Ans: | c   | a   | c   | b   | a   | c   | a   |

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### PRACTICE TEST NO. 4

1. Resistivity of a substance is defined as the resistance of a .... of that substance:

(a) Meter (b) Meter square (c) Meter cube

2. Value of current in a short circuit is (a) Infinite

(b) Zero

(c) Minimum

(d) Centimeter (d) Maximum

3. Resistivity of a wire is ohm-m if 0.75 A current flows through it by applying 1.5 V potential difference, take length and cross section as 5m and  $2.5 \times 10^{-7} m^2$ .

(a)  $1 \times 10^{-7}$ 

(b)  $2.63 \times 10^{-8}$ 

(c) 19 × 10-8

4. In a conductor, if 6-coulomb charge flows for 2 seconds. The value of electric current will be

(a) 3 amp

UNIT 07

(c) 3 volts

(b) 2 amp (d) 2 volts

5. In series circuit, current remains

(a) Same

(c) Sometime same sometimes different

(b) Different (d) None of them

(c) Nichrome

6. Which of the following has a negative temperature coefficient of resistance? (b) Carbon

(a) Tungsten 7. Correct form of ohm's law

(b) 1 ∝ V

(c) V = IR

(d) Platinum (d) Both B & C

(a) I = VR8. The SI unit for resistance is?

(a) Ohm

(b) Ampere

(c) Watt (d) Volts 9. If the load resistance is less or greater than the source resistance, then power delivered to the load will be:

(a) Zero

Less than maximum

Maximum

(d) infinite

10. A class has ten 25 W compact fluorescent lamps. If these lamps are turned on for 10 hours every day, their energy consumption in 20 days is:

(a) 1 kWh

(b) 10 kWh

(c) 5 kWh

(d) 50 kWh 11. In the presence of internal resistance of the source. Which one of the following relations between potential difference (V) and e.m.f (E) is correct? (when source is giving current to external resistance)

(a) E = 0

(b) E>V

(c) E = V

(d) E < V

12. Four equal resistors when connected in series dissipate 5 W power. If they are connected in parallel, the power dissipated will be:

(a) 20 W

(b) 60 W

(c) 40 W

13. A battery of emf 20 V and internal resistance r is connected across external resistance R. What is the observed potential difference across the terminals of the battery when external resistance R is made equal to internal resistance r:

(a) 20 V

(b) 15 V

(c) 10 V

14. An iron is rated at 550 W. How much would it cost to operate it for 2.5 hours at PKR 20/kWh?

(b) PKR 47.5

(c) PKR 37.5

(d) PKR 57.5

15. The source of e.m.f transfers its maximum power to the external circuit when (r=internal resistance, R= load resistance):

(a) r = 0

(b) r < R

16. A 200 W bulb B₁, a 150 bulb B₂ and a 75 W bulb B₃ are connected in series across a 240 V source. Now P1, P2 and P3 are the output powers of bulbs B1, B2 and B3 respectively, then:

(b)  $P_1 < P_2 = P =$ 

(c) P₁>P₂>P₃

| Sr.      | 1.   | 2.   | 3     | A |    |    | The same of |    |    |     |     |     | (-) |     | 2-43 |     |
|----------|------|------|-------|---|----|----|-------------|----|----|-----|-----|-----|-----|-----|------|-----|
| Ans:     | c    | d    | 3     | - | 3. | 6. | 7.          | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15.  | 16. |
| Sr. Ans: | T PR | ED D | VANIA | a | a  | b  | d           | a  | b  | d   | b   | d   | c   | a   | c    | d   |

| _  |          |     |       | Charles and the second section of |
|----|----------|-----|-------|-----------------------------------|
| 17 | Pick out | the | wrong | statement:                        |

- (a) In a simple battery circuit, the point of lowest potential is the negative terminal of the battery
- (b) The resistance of an incandescent lamp is greater when the lamp is switched off
- An ordinary 100 W lamp has less resistance than a 60 W lamp.
- The heat developed in a uniform wire increase directly as the resistance of the wire used is
- 18. Two electric bulbs whose resistances are in the ratio of 1:3 are connected in series. The powers dissipated in them have the ratio: (c) 1:6 (d) 3:1
- (b) 1:3

- 19. The power rating of an electric motor which draws a current of 4.25 A, when operated at 200 V is nearly:
  - (a) 425 W
- (b) 750 W
- (c) 525 W
- (d) 850 W

- 20. In 1 minute, 1 kW electric fire uses 10 times as much energy as a: (a) 1 W LED
  - (b) 100 W bulb
- (c) 10 W LED
- (d) 1000 W bulb
- 21. Three 60 W bulbs are in parallel across the 110 V power line. If one bulb burns out:
  - (a) There will be heavy current in main line
    - (b) Rest of the two bulbs will stop glowing
    - (c) Rest of the two bulbs will glow with initial brightness
    - (d) All bulbs will become short circuit
- 22. If the electromotive force of the battery is 5 V, the total energy supplied by the battery to unit coulomb charge is:
  - (a) 2.5 Joules
- (b) 1 Joule
- (c) 5 Joules
- (d) 10 Joules
- 23. The specific resistance of manganin is  $50 \times 10^{-8} \Omega$  m. What is the resistance of a cube of length 50cm will be:
  - (a) 10⁻⁶ Ω
- (b)  $2.5 \times 10^{-5} \Omega$
- (c) 10⁻⁸ Ω
- (d)  $5 \times 10^{-4} \Omega$
- 24. A piece of copper is to be shaped into a conductor of minimum resistance. The possible values of length and diameter are:
  - (a) I,d
- (b) 2l,d
- (c)  $\frac{1}{2}$ , 2d
- (d)  $2l, \frac{d}{2}$
- 25. What is the number of equal parts into which a conductor having a resistance Ro = 100 Q should be cut to obtain the resistance  $R = 1 \Omega$  if the parts are connected in parallel?
  - (a) 5

- (c) 20
- (d) 2

- 26. The example of non-ohmic resistance is:
  - (a) Copper wire

- (b) Carbon resistance (d) Tungsten wire
- (c) Silver wire 27. What is the unit of temperature coefficient?
  - (a) °C-1
- (b) Ω°C

(b) 10

- (c) °C
- (d) Ω°C
- 28. When  $2\Omega$ ,  $4\Omega$  and  $6\Omega$  resistances are connected in parallel, their resultant resistance will be:
  - (a) 12 Ω
- (b)  $\frac{11}{12}\Omega$
- Data is insufficient
- 29. Two electric bulbs rated as (p1, V) and (P2, V) are connected in series across V source. Then the total power dissipation by combination is:
  - (a) P1 + P2

- 30. If two electric bulbs have 40 W and 60 W rating at 220V, then the ratio of their resistance will be: (c) 3:4 (b) 2:3 (a) 3:2

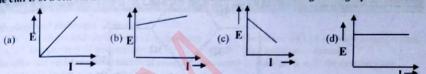
- 31. A hand drill draws 4 A and has a resistance 14.6 Ω. What power does it use? (d) 284 W (c) 134 W (b) 184 W (a) 234 W
  - 17. 18. 19. 20. 21. 22. 23. d c C a C

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32. The emf E of a cell varies with the current drawn from the cell according to the graph:



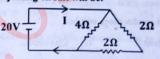
- 33. The resistance of a conductor increases with
  - (a) Increase in length

- (b) Increase in temperature
- (c) Decrease in cross-sectional area
- (d) All of these
- 34. The terminal potential difference of a cell is greater than its emf it is:
  - (a) Being discharged

(b) In open circuit

(c) Being charged

- (d) Either charge or discharge
- 35. The current in the adjoining circuit will be:



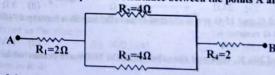
(b) 0.5 A

(c) 10 A

- 36. The electric bulb have tungsten filaments of same lengths. If one of them gives 60 watt and other 100 watt then,
  - (a) 100 watt bulb has thicker filament
  - (b) 60 watt bulb has thick filament
  - (c) Both filament are of same thickness (d) It is possible to get different wattage unless the lengths are different
- 37. Two identical heaters rated 220 volt, 1000 watt are placed in series with each other across 220 volt lines. If resistance do not change with temperature then the combined power is:
- (a) 1000 watt
- (b) 2000 watt
- (c) 500 watt
- (d) 400 watt
- 38. The equivalent resistance of resistors connected in series is always:
  - (a) Equal to the mean of component resistors
  - (b) Less than the lowest of component resistors
  - (c) In between the lowest and the highest of component resistors
  - (d) Equal to sum of component resistor
- 39. By increasing the temperature, the specific resistance of a conductor and a semiconductor is
  - (a) Increase for both

two adjacent vertices of square is:

- (b) Decrease for both
- (c) Increase, decrease (d) Decrease, increase 40. In the given figure, the equivalent resistance between the points A and B is:

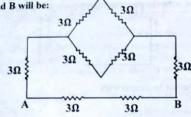


- (a) 8 Q
- (b) 6 Q
- (c) 4 Q 41. A wire has resistance 16  $\Omega$ . It is bend in form of a square. The effective resistance between any

(b) 6 Q (c) 9 Q (d) 12 Ω 41.

(a) 4Ω

42. Equivalent between A and B will be:



(b) 18 ohm

(c) 6 ohm

43. The resistance of a wire of uniform diameter d and length L is R. The resistance of another wire of the same material but diameter 2d and length 4L will be:

44. The length of the wire is doubled. Its conductance will be:

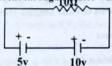
(a) Unchanged

(b) Halved

(c) Ouadrupled

of the original

45. In the diagram shown, the current through resistor will be:



46. If R₁ and R₂ are respectively the filament resistance of a 400W bulb and 200W bulb, designed to operate on the same voltage, then:

(a)  $R = 2R_2$ 

(b)  $R_2 = 4R_1$ 

(c)  $R_2 = 2R_1$  (d)  $R_1 = 4R_2$ 

47. The resistance of a wire R is cut into four equal parts and these parts are connected side by side. The effective resistance becomes:

48. A wire has a resistance of 12 ohm. It is bent in the form of a circle. The effective resistance between the two points on any diameter of circle is:

(b) 24 Ω

(c) 6 \O

49. Three resistors of 5  $\Omega$ , 10  $\Omega$  and 15  $\Omega$  are connected in parallel across a battery of 10V. The potential drop across 10 Ω resistor is:

(b) 5 V

(c) 3 V

50. Two electric bulbs, one of 200 V, 40W and the other of 200V, 100W are connected in a house wiring circuit:

(a) They have equal currents through them

(b) The resistance of filaments in both the bulbs is same

(c) The resistance of filament in 40W bulb is more than the resistance in 100W bulb

(d) The resistance of the filament in 100 W bulb is more than he resistance in 40W bulb

| Sr.  | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | d   | ь   | b   | b   | c   | d   | d   | d   | C   |

MDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

### PRACTICE TEST NO. 5

1 The electrical resistance of metals:

(a) Increases with an increase in temperature (b) Decreases with an increase in temperature

(c) Independent of temperature

(d) May increase or decrease

2. The effective resistance of n identical resistors connected in parallel is x. If the resistors are connected in series, the effective resistance becomes:

(c) n²x

3. Three resistances 4  $\Omega$  each are connected in the form of an equilateral triangle. The effective resistance between two corners is:

(a) 8 Q

(b) 12Ω

4. When a current flows through a conductor its temperature:

(a) May increase or decrease (c) Decrease

(b) Remains same

(d) Increase

5. Through a semiconductor, an electric current is due to drift of:

(a) Free electrons (b)

(c) Series or parallel with it

Free electrons and holes

Positive and

(d) protons

negative ions 6. Two wires A and B of same material and same length have radius r and 2r. If resistance of wire A is 32 Ω, then resistance of B will be:

(a) 8 Q

(b) 16 Ω

(c) 32 Q

(d) 128 Ω

7. A 60 watt bulb carries a current of 0.5 amp. The total charge passing through it in 1 hour is: (a) 3600 C (b) 3000 C (c) 2400 C (d) 1800 C

8. The brightness of a bulb will be reduced if a resistance is connected in: (a) Series with it

(b) Parallel with it (d) Brightness of bulb cannot be reduced

9. Two electric lamp of 40 watt each are connected in parallel. The power consumed by the combination will be:

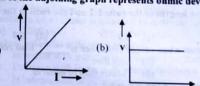
(a) 20 watt

(b) 80 watt

(c) 500 watt

(d) 100 watt

10. Which of the adjoining graph represents ohmic device.



11. The emf of battery is 6 V and internal resistance  $0.5~\Omega$ . It is connected to a wire of resistance  $2~\Omega$ The current in the wire is: (a) 3 A

(b) 0.33A

12. A cell of internal resistance 'r' is connected on an external resistance R. The current will be

(a) R=r

(b) R<r

13. The positive temperature coefficient of resistance is for: (a) Carbon

(b) Germanium

(c) Copper

(d) Silicon

| UNIT 07    |                       | CUF       | RENT ELECTR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| 1.4 A coll | whose emf is 2V a     | nd inte   | rnal resistance is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (a)        | $T_1 > T_2$           |           | $T_1 \approx T_2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| 16. Which  | of the following i    |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ower? 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| (a)        | $P = I^2R$            | (b)       | P = VI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (c)       | $P = \frac{V^2}{R}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 17. An ele | ctric bulb is rated   | 220 V.    | 200 W. The pow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| (2)        | 50 W                  | (b)       | 25 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 8. Three   | equal resistors co    | nnected   | to parallel have                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | equival   | ent resistance R/9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | . 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| (a)        | R/3                   | (b)       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 9. The re  | sistance of insulat   | tors:     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| (a)        | Increase with incr    |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (b)        | Decrease with inc     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (c)        |                       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 0. The co  | nductivity of a su    | per con   | ductor is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           | THE REPORT OF THE PARTY OF THE |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a)        | Infinite              | (b)       | Very large                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 1. What    | carries current in    | an elec   | trolyte?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                | Both +ve and - 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| (a)        | Electrons only        | (b)       | -ve ions only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (c)       | + ve ions only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (d)            | Both +ve and - 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|            | e resistance are in   | the ra    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (a)        | 4:9                   | (D)       | 9:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 5. The ma  | Greater than          | deliver   | ed to a circuit wi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (b)       | Less than                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Team of        | Control of the Contro |
| (c)        | Equal to              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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|            | n resistor having     | 2 A cm    | rent will dissipa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| (a)        |                       | (b)       | 6 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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|            | nce of 220 V, 100     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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(a) 4.84 ohm

(b) 484 ohm

(c) 48.4 ohm

(d) 48440 ohm

26. Two electric bulb whose resistances are in the ratio of 1:4 are connected in parallel to a constant voltage source. The powers dissipated in them have the ratio:

(a) 1:2

(b) 4:1

(d) 1:4 (c) 2:1 27. Three resistances  $2\Omega$ ,  $3\Omega$  and  $5\Omega$  are connected in parallel to a battery of 10 V and of negligible internal resistance. The potential drop across the  $3\Omega$  resistance will be:

(a) 2 V

(b) 3 V

(c) 5 V

(d) 10 V

|      |     | 1000 |     |     |     |     |     |     |     |     |     |     | 27      |
|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| Sr.  | 14. | 15.  | 16. | 17. | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. | 26. 27. |
| Ans: | b   | a    | d   | a   | b   | b   | a   | d   | d   | c   | d   | b   | b a     |

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By AZHAR IQBAL 0336-7098894

CURRENT ELECTRICITY

| 28. A 220 V and 700 W | electric kettle and four 22 | 0 V and 100 W bulbs a    | re connected in parallel. On |
|-----------------------|-----------------------------|--------------------------|------------------------------|
| connecting this comb  | bination with 220 V electr  | ic supply. The total cur | rrent will be:               |
| (a) 55 A              | (b) 69A                     | (c) 50A                  | (d) 02A                      |

29. A cell of emf E has internal resistance r. It is connected across external resistance of value x. The notential difference across the terminals of cell is E/2, then:

(a) x = r

(b) x < r

(c) x>r

(d) x = 0

30. Two electric bulbs rated as (P1, V) and (P2, V) are connected in series across V(volts) source. Then the total power dissipation by combination is:

(a)  $P_1 + P_2$ 

UNIT 07

31. The unit of electromotive force is:

(a) Newton

(b) Watt

(c) Joule

32. The electrical energy consumed by a 100 W bulb in 10 hour is:

(a) 1000 kWh

(b) 10 kWh

(c) 100 kWh

33. Which of the following pair/pairs contain sources of emf only?

(a) Batteries and thermocouples (c) Solar cells and electric generator

(b) Batteries and transformers

(d) Both A and C

34. Two 100 W,220 V bulbs are first connected in series then in parallel. Power in each case

respectively will be:

(a) 200 W, 160 W (b) 50 W, 200 W (c) 50 W, 100 W (d) 100 W, 50 W 35. Of the two bulbs in a house, one glows brighter than the other. Which of the two has larger resistance?

(a) Bright bulb

(c) Both have same resistance

(b) Dim bulb

(d) Brightness does not depend on resistance

36. If the power rating of a vacuum cleaner is 550 W, the current it draws in a 220V electric circuit

(a) 1

(b) 2.5 A

(c) 1.5 A

(d) 3.7 A

37. Internal resistance of a battery is ..... ohm, if, E=10V, V₁=9V, I=1A

(b) 0.1

(d) None of these

(c) 0.01 relationship exists between current and voltage in terms of Ohm's law.

(a) Non linear

(b) Varying (c) Linear

(d) None of them

39. A resistance of 40 Ohms is attached to a circuit having current of 300 Amp, Find its voltage. (a) 12000 volts (b) 15000 volts (c) 20000 volts

40. Terminal potential difference of a cell

(a) Increases with increase in its internal resistance

(b) Decrease with increase in internal resistance

(c) Is independent of its internal resistance

(d) None of these

41. If the conductor resistance is 50 ohm and the current passing through it is 5A. What is the value of potential difference? (a) 150V

42. Ohm's law is true for

(b) 50V

(c) 250V

(d) 15V

(a) Metallic conductors at low temperature

(b) Metallic conductors at high temperature

For electrolytes, when current passes through them For diode when current flows

| Sr.  | 28.    | 29.   | 30. | 31 | 32  | 22  | 34. | No. | -   |       |     |      |      |        |      |
|------|--------|-------|-----|----|-----|-----|-----|-----|-----|-------|-----|------|------|--------|------|
| Ans: | d      | C     | b   | -  | 24. | 33. | 34. | 35. | 36. | 37.   | 38. | 39.  | 40.  | 41.    | 42.  |
| MDCA | T PD I | ID DA | OK  | a  | d   | d   | В   | b   | b   | a     | c   | a    | b    | c      | a    |
|      |        | CL BO | OK  |    |     |     | 349 |     |     | By AZ | HAR | IQBA | L 03 | 36-709 | 8894 |

| UNII 07                                   | CORRETT ELLC                       | 285 Str 1 (IDHS/je)                 |
|-------------------------------------------|------------------------------------|-------------------------------------|
|                                           | whose resistivity changes very rap | oidly with change of temperature is |
| called a:  (a) Resistor  (c) Thermocouple |                                    | r-conductor<br>mistor               |

- 44. When the length of the conductor is doubled and the area of cross-section remain the same then its resistance:
  - (a) Remains the same (c) Will become half
- (b) Will be doubled (d) Will increase by four times
- 45. If 1 ampere current will flow in 5m conductor for 1 hour the charge flow will be
- (c) 1C (b) 18000C 46. A potential difference of 10V is applied across a conductor whose resistance is 2.5 ohm. What is the value of current flowing through it?
- (b) 2A (c) 6A (d) 10A 47. The specific resistance of a conductor increases with:
  - (a) Increase in temperature
  - (b) Increase in cross-sectional area
  - (c) Decrease in length
  - (d) Decrease in cross-sectional area
- 48. Req =  $R_1 + R_2 + R_3 + \dots + Rn$  is the combination in
- (a) Series
- (b) Parallel
- (c) Both a and b
- (d) None of these
- 49. Materials that have both metallic and non-metallic characteristics are called:
- (a) Semiconductor (b) Metal
- (c) Non metal
- (d) Organic compound

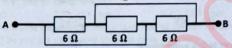
- 50. As compared to thin wires, thick wires have:
  - (a) More resistance (b) No resistance (c) Less resistance (d) Same resistance
- 51. The battery of a pocket calculator supplies 0.35A at a potential difference of 6 volts. What is the power of the calculator?
- (a) 9 Watt
- (b) 2.1 Watt
- (c) 4 Watt
- (d) 7 Watt
- 52. An immersion heater of 400 watts kept on for 5 hours will consume electrical power of:
- (a) 2KWh
- (b) 20 KWh
- (c) 6KWh
- (d) 12KWh

- 53. The graphical representation fo Ohm's law is:
  - (a) Hyperbola
- (b) Ellipse
- (c) Parabola
- (d) Straight line
- 54. The specific resistance of a rod of copper as compared to that of thin wire of copper is:
  - (a) Less

(b) More

- (c) Same
- (d) Depends upon the length and area of cross-section of the wire
- 55.  $1/\text{Req} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + 1/R_n$  is the combination in
  - (a) Series
- (b) Parallel
- (c) Both of them
- (d) None of them

56. Three 6  $\Omega$  are connected as shown in the diagram.



What is the resistance between points 'A' and 'B'?

(a) 6Ω

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- (b) 16Ω
- (c) 4 n
- (d) 2 n

| Sr.  | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. | 51. | 52. | 53. | 54. | 55. | 56. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | d   | b   | d   | a   | a   | a   | a   | c   | b   | a   | ď   | c   | b   | 56. |

By AZHAR IQBAL 0336-7098894

UNIT 07 57. Which combinations of seven identical resistors each of 2  $\Omega$  gives rise to the resultant of 10/11  $\Omega$ ?

CURRENT ELECTRICITY

(a) 5 parallel, 2 series

- (b) 3 parallel, 4 series
- (c) 4 parallel, 3 series (d) 2 parallel, 5 series
- 58. If a resistor having resistance 'R' is cut into three equal parts, then the equivalent of parallel combination is:

  - (a)  $\frac{6}{}$  (b)  $\frac{3}{}$

- 59. The resistance of a piece of wire is 12 Ω. It is bent to form an equilateral triangle. What is the equivalent resistance between any two corners of the triangles?
  - (a) 1.3 Ω
- (b) 4.0Ω
- (d) 2.7Ω
- 60. Total resistance between 'A' and 'B' in the given circuit is:



- (a) 5.6 Ω
- (b) 3.33 Ω
- (c) 0.33 Ω
- 61. Calculate the charge passing through the circuit if it's current is 10 Amp and the recorded time is 15 seconds:
  - (a) 1500 coulomb

(a) 250 seconds

(b) 150 coulomb

(b) 350 seconds

(c) 13400 coulomb

(c) 400 seconds

(c) Henry

(d) -140 coulomb (d) Watt

- 62. Coulomb per second is equivalent to:
  - (a) Ampere (b) Farad
- 63. Calculate the time taken for the charges to complete the circuit if the total charges were 5000 Coulomb and the current of the circuit was 20 Amp?
- (d) 500 seconds

- 64. Copper wire is used as connecting wire because:
  - (a) Copper has high electrical resistivity
  - (c) Copper has low electrical conductivity
- (b) Copper has low electrical resistivity (d) Copper has high value of elasticity
- 65. The fractional change in resistance per Kelvin is known as:
- - (a) Coefficient in resistance (c) Resistance
- (b) Temperature coefficient of resistance
- (d) None of these

| Sr.  | 57. | 58. | 59. | 60. | 61. | 62. | 63. | 64. | 65. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | d   | C   | d   | d   | b   | a   | a   | b   | b   |

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UNIT 08

# **ELECTROMAGNETISM**

### PRACTICE TEST NO. 1

| or.            | 1. 2. 3.<br>b a a                                       | 4.<br>d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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|                | (a) An electric for | (c) The energy of the Lorentz force can be call (a) $F=q(E+vxB)$ . An electron is moving on the second of the partial of the partial (a) Straight line (b) Straight line (c) Retard along X-deharge moving with varieties A charge q is moving in (a) Charge (b) Retard along X-deharge to mass ratio of (a) $\frac{v}{Br}$ . The magnetic flux is magnetic field (a) 0.5 cm. The radial form magnetic field rbit is:  (a) 10 cm. The double all the pagnetic field over an anally it is and the second flux is magnetic field rbit is:  (a) 10 cm. The field over an anally it is and the second flux is magnetic field rbit is:  (a) 10 cm. The field over an anally it is and the second flux is magnetic field rbit is:  (a) 0.50 The field over an anally it is and the second flux is magnetic field rbit is:  (a) 0.50 Weber St. 1. 2. 3. | (c) The energy of the particle Lorentz force can be calculated  (a) $F=q(E+xxB)$ (b)  An electron is moving on a circle of the for it will be:  (a) $\frac{v}{Br}$ (b)  A charged particle enters a magnetic enters a magnetic enters a magnetic enters are suit (a) Straight line (b)  A charge moving with velocity engative X-direction. As a resuit (a) Remain unaffected (c) Retard along X-axis a charge q is moving in a magnetic enters are suit (a) Charge (b)  Charge to mass ratio of neutron (a) $\frac{v}{Br}$ (b)  The magnetic flux is maximum (a) $0^{\circ}$ (b)  A unit of magnetic induction is (a) $Wb m^{-2}$ (b)  An electron is moving in a circle educed to B/2. The radius of the electron describes a circular he electron describes a circular he electron is doubled, then the (a) $0.5 \text{ cm}$ (b)  A proton and an $\alpha$ -particle, a miform magnetic field normal rbit is:  (a) $10 \text{ cm}$ (b)  I we double all the paramete $v$ (b)  I we double all the paramete $v$ (c)  (a) $v$ times (b)  (b) 0.50 T field over an area of 2  (a) $v$ times (b)  (b) 5.50 T field over an area of 2  (a) $v$ (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (c) The energy of the particle Lorentz force can be calculated by using the (a) $F=q(E+vxB)$ (b) $F=q(E-vx)$ . An electron is moving on a circular path of $e^{it}$ (a) $e^{it}$ (b) $e^{it}$ (b) $e^{it}$ (c) $e^{it}$ (d) $e^{it}$ (e) $e^{it}$ (e) $e^{it}$ (f) $e^{it}$ (f) $e^{it}$ (e) $e^{it}$ (f) $e^{it$ | (c) The energy of the particle Lorentz force can be calculated by using the formula (a) $F=q(E+vxB)$ (b) $F=q(E-vxB)$ An electron is moving on a circular path of radius reading for it will be:  (a) $\frac{v}{Br}$ (b) $\frac{B}{rv}$ A charged particle enters a magnetic field B with it B. The path of the particle will be:  (a) Straight line (b) Circle Charge moving with velocity v in x-direction is su negative X-direction. As a result, the charge will:  (a) Remain unaffected (c) Retard along X-axis Charge q is moving in a magnetic field then the magnetic to mass ratio of neutron is:  (a) $\frac{V}{Br}$ (b) $\frac{2v}{Br}$ The magnetic flux is maximum when angle between (a) $\frac{V}{Br}$ (b) $\frac{V}{Br}$ The magnetic induction is:  (a) $\frac{V}{Br}$ (b) $\frac{V}{Br}$ The additional in a circle of radius r in a unit of magnetic induction is:  (a) $\frac{V}{Br}$ (b) $\frac{V}{Br}$ An electron is moving in a circle of radius r in a unit of magnetic induction is:  (a) $\frac{V}{Br}$ (b) $\frac{V}{Br}$ An electron describes a circular orbit of radius 2 of the electron is doubled, then the radius of the orbit (a) 0.5 cm (b) 1.0 cm A proton and an $\alpha$ -particle, accelerated through miform magnetic field normally. If the radius of proton is:  (a) $\frac{V}{Br}$ (b) $\frac{V}{Br}$ (c) $\frac{V}{Br}$ (d) $\frac{V}{Br}$ (e) $\frac{V}{Br}$ (f) $\frac{V}{Br$ | (c) The energy of the particle  Lorentz force can be calculated by using the formula:  (a) $F=q(E+vxB)$ (b) $F=q(E+vxB)$ (c)  An electron is moving on a circular path of radius r with a complex form for it will be:  (a) $\frac{v}{Br}$ (b) $\frac{B}{rv}$ (c)  A charged particle enters a magnetic field B with its init B. The path of the particle will be:  (a) Straight line (b) Circle (c)  A charge moving with velocity v in x-direction is subject to the particle of th | (c) The energy of the particle  Lorentz force can be calculated by using the formula:  (a) $F=q(E+vxB)$ (b) $F=q(E-vxB)$ (c) $F=q(E+v.B)$ An electron is moving on a circular path of radius r with speed v in a term for it will be:  (a) $\frac{v}{Br}$ (b) $\frac{B}{Fv}$ (c) $\frac{vr}{B}$ A charged particle enters a magnetic field B with its initial velocity may a straight line (b) Circle (c) Ellipse a charge moving with velocity v in x-direction is subjected to a field of legative X-direction. As a result, the charge will:  (a) Remain unaffected (b) Mass (c) Velocity and Charge q is moving in a magnetic field then the magnetic force does (a) Charge (b) Mass (c) Velocity and Charge to mass ratio of neutron is:  (a) $\frac{v}{Br}$ (b) $\frac{2v}{Br}$ (c) $\frac{2v}{B^2r^2}$ The magnetic flux is maximum when angle between magnetic field and (a) 0° (b) 60° (c) 90°  A unit of magnetic induction is:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{B^2r^2}$ and electron is moving in a circle of radius r in a uniform magnetic flux doubled, then the radius of the orbit will become:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br^2}$ (c) $\frac{v}{Br^2}$ and electron describes a circular orbit of radius 2 cm in a uniform magnetic field normally. If the radius of proton orbit is 10 cm (c) 2.0 cm (d) 0.5 cm (e) 2.0 cm (e) 2.0 cm (for magnetic field normally. If the radius of proton orbit is 10 cm (c) $\frac{v}{Br^2}$ (d) $\frac{v}{Br^2}$ (e) $\frac{v}{Br^2}$ (e) $\frac{v}{Br^2}$ (for magnetic field normally. If the radius of the orbit will become:  (a) $\frac{v}{Br^2}$ (b) $\frac{v}{Br^2}$ (c) $\frac{v}{Br^2}$ (c) $\frac{v}{Br^2}$ (d) $\frac{v}{Br^2}$ (e) $\frac{v}{Br^2}$ (for magnetic field normally. If the radius of proton orbit is 10 cm (e) 2.0 cm (for magnetic field normally. If the radius of proton orbit is 10 cm (for magnetic field normally. If the radius of proton orbit is 10 cm (for magnetic field normally) (for magnetic force between magnetic field and velocity) then magnet | (c) The energy of the particle Lorentz force can be calculated by using the formula:  (a) $F = q(E + vxB)$ (b) $F = q(E - vxB)$ (c) $F = q(E + v,B)$ (d) An electron is moving on a circular path of radius r with speed v in a transverse $e^{t/m}$ for it will be:  (a) $\frac{v}{Br}$ (b) $\frac{B}{rv}$ (c) $\frac{vr}{B}$ (d) A charged particle enters a magnetic field B with its initial velocity making an a 3. The path of the particle will be:  (a) Straight line (b) Circle (c) Ellipse (d) A charge moving with velocity v in x-direction is subjected to a field of magnetic field with the charge will:  (a) Remain unaffected (b) Start moving in a circular (c) Retard along X-axis (d) Move along a helical path (a) Charge q is moving in a magnetic field then the magnetic force does not depend (a) Charge (b) Mass (c) Velocity (d) Charge to mass ratio of neutron is:  (a) $\frac{v}{Br}$ (b) $\frac{2v}{Br}$ (c) $\frac{2v}{B^2r^2}$ (d) The magnetic flux is maximum when angle between magnetic field and area is:  (a) $\frac{v}{Br}$ (b) $\frac{2v}{Br}$ (c) $\frac{2v}{B^2r^2}$ (d) A unit of magnetic induction is:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br^2}$ (d) A unit of magnetic induction is:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br^2}$ (d) A consider the electron is moving in a circle of radius r in a uniform magnetic field B. Sureduced to B/2. The radius of the circle now becomes:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br}$ (d) A consider the electron describes a circular orbit of radius 2 cm in a uniform magnetic field B. Sureduced to a circular orbit of radius 2 cm in a uniform magnetic field B. Sureduced to B/2. The radius of the circle now becomes:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br}$ (d) $\frac{v}{Br}$ (d) A relectron and an $\alpha$ -particle, accelerated through same potential difference, niform magnetic field normally. If the radius of proton orbit is 10 cm, then the robit is:  (a) $\frac{v}{Br}$ (b) $\frac{v}{Br}$ (c) $\frac{v}{Br}$ (d) $\frac{v}{Br}$ (e) $\frac{v}{Br}$ (d) $\frac{v}$ |

| 15    | The m     | agnetic field o                                      | utside the    | solenoid         | due to    | current    | is taken                          | as :      | 1 30      | 9,000    |                             |         |      |
|-------|-----------|------------------------------------------------------|---------------|------------------|-----------|------------|-----------------------------------|-----------|-----------|----------|-----------------------------|---------|------|
| 1.0.  | (a)       | 72                                                   | (b)           | Weak             |           |            | Zero                              |           | -         | 4) I     | Jniforn                     |         |      |
| 16    |           | noid 15 cm lor                                       | g has 300     | turns ar         | nd a cu   | rrent of   | 5 A flow                          | s throu   | ah it     | What     | ie the                      | maan    | atia |
| 10.   | field of  | utside the sole                                      | noid?         |                  |           |            | 2 74 11011                        | 3 thiou   | ga a.     | · mat    | is the                      | magn    | etic |
|       | (a)       | $0.65 \times 10^{-2}$                                | Wb $m^{-2}$   |                  |           | (b)        | 4.4 ×                             | 10-3 W    | h m-2     |          |                             |         |      |
|       | (c)       | $1.3 \times 10^{-2}$ \                               |               |                  |           |            | zero                              |           | U III     |          |                             |         |      |
| 17.   | One te    | sla is equal to                                      |               |                  |           |            | 2010                              |           |           |          |                             |         |      |
|       |           | $NA^{-1}m^{-1}$                                      | (b)           | $N^{-1}An$       | 2         | (c)        | ANm-                              | 1         | (4        | N A/     | $A^{-1}m$                   |         |      |
| 18.   | A curr    | ent carrying                                         | power line    | carries          | electro   | nie eurr   | ent from                          | south     | to nort   | h W      | hat mi                      |         |      |
|       | direction | on of the magn                                       | etic field :  | at a poin        | above     | the wir    | ?                                 | South     |           | . **     | nat w                       | in be   | ne   |
|       | (a)       | East to west                                         | (b)           | North to         | south     | (c)        | West to                           | east      | (4        | 1 6      | outh to                     | north   |      |
| 19.   | A prot    | on enters a ma                                       | agnetic fie   | ld of flux       | densit    | 1 3 0 W    | h m-2                             | ith a ve  | locity    | of 4     | 107                         | north   |      |
|       | an ang    | e of 30° with                                        | the field.    | The force        | on the    | proton     | will be                           | nin a ve  | locity    | 014      | 10                          | ms -    | at   |
|       | (a)       | $2.4 \times 10^{-12}$                                | N (b)         | 24 × 10          | )-12 N    |            | 9.6 × 1                           | n-12 N    | (4)       |          |                             | 0-12-   | 100  |
| 20.   | The ma    | gnetic force is                                      | simply a:     |                  |           | (0)        | 7.0 A I                           | 0 14      | (u)       | 0.5      | 30 X I                      | U N     |      |
|       | (a)       | Reflecting for                                       | rce           |                  |           | (b)        | Restorir                          | o force   |           |          |                             |         |      |
|       | (c)       | Deflecting for                                       | rce           |                  |           | 1.1        | 0 .                               |           |           |          |                             |         |      |
| 21.   | By dou    | bling the num                                        | ber of turi   | ns of the        | coil an   | d makin    | area of                           | each tu   | rn half   | the      |                             | 4: 0    |      |
|       | linked v  | with coil is:                                        |               |                  |           | 17 (12)    | , 01                              | cach tu   | rn nan    | , the    | magne                       | tic Hu  | X    |
|       | (a)       | Doubled                                              | (b)           | Halved           |           | (c)        | Quartere                          | d         | (4)       | San      | . F.                        |         |      |
| 22.   | A solen   | oid is 1.0 m lo                                      | ng and it     | has 4250         | turns.    | If a cur   | rent of 5.                        | O A is fl | owing     | throu    | ab it                       |         | 33   |
| 1     |           |                                                      | ts centre?    |                  |           |            |                                   |           | owing     | mrou     | gn n,                       | wnat 1  | 5    |
|       | (a)       | $5.4 \times 10^{-2} \text{T}$                        | (b)           | 2.7 ×            | 10-2T     | (c)        | 1.35 ×                            | 10-2T     | (d)       | 0.1      | 075 × 1                     | 10-2m   |      |
| 23.   | A long    | olenoid has n                                        | turns per     | metre an         | d curr    | ent I A i  | flowing                           | throng    | it Th     | 0.0      | )/3 X [                     | 0 1     | 33   |
| 1     |           |                                                      |               |                  |           |            |                                   | oug.      |           | e mag    | gnetic i                    | neid at |      |
|       | (a)       | $\mu_o nI$                                           | (b)           | zero             |           | (c)        | $\mu_{\alpha}nI$                  |           | (4)       | $2\mu_o$ | m1                          |         |      |
| 4     | 3/L:-L    | 2                                                    | a in a bright |                  |           |            |                                   |           |           | 240      | 141                         |         |      |
| 4.    | (a)       | among the foll                                       | owing qua     | intities, i      | not af    | fected b   | the mag                           | netic fi  | eld?      |          |                             |         |      |
|       | (4)       | wioving charge                                       | e             |                  |           | (b)        | Charge i                          | n magne   | etic flux |          |                             |         |      |
| 5. 1  | or whi    | Current flowing                                      | ig in condu   | ctor             |           | (4)        | Canal                             |           | e         |          |                             |         |      |
| -     | (a)       | ch angle betwe                                       | en area ai    | nd magn          | etic fiel | d, flux is | maximu                            | m         | i netj    | 100      |                             |         |      |
| 6. N  | /agneti   | 0 degree                                             | (b)           | 90 degre         | e         | (c)        | 45 degre                          | e         | (d)       | 60       | degree                      |         |      |
|       | (a)       | c force between<br>Distance                          | n wires is    | inversely        | propo     | rtional    |                                   |           |           |          |                             |         |      |
|       | (c)       | Charge on ther                                       |               |                  |           | (b)        | Current                           |           |           |          |                             |         |      |
| 7. F  | orce or   | a moving ob                                          | n             |                  |           | (d)        | None of                           | these     |           |          |                             |         |      |
| a     | nd B is   | a moving ch                                          | arge in a     | uniform          | magne     | tic field  | will be n                         | naximu    | m, whe    | n an     | gle bet                     | ween    | v    |
|       | (a)       | 0                                                    | as            | 20               |           |            |                                   |           |           |          |                             |         |      |
| 8. C  | ne cha    | rge enters in n                                      | (D)           | 30               |           | (c)        | 60                                |           | (d)       | 90       |                             |         |      |
| v     | elocity   | rge enters in n<br>of 10 ⁷ m/s. Wh        | of will be    | the male         | 10-1      | normall    | y with sp                         | ecific c  | harge 1   | 108 C    | kg an                       | d       |      |
|       | (a)       | l m                                                  | 4             |                  | 01 61     | icie.      |                                   |           |           |          |                             |         |      |
| ). It | 'A' is    | fundamental d<br>[MT ⁻² A ⁻² ] | imension      | 0.5 m            |           | (c)        | 5 m                               | -         | (d)       | 10       | m                           |         |      |
|       | (a)       | MT-2A-21                                             | (P)           | or ampe          | re then   | the dim    | ension of                         | magne     | tic fiel  | d stre   | ength i                     | s:      |      |
|       | Asces     | [MT ⁻² A ⁻² ]                  | (0)           | [MI-A            | ]         | (c)        | [MT ² L ² , | A-13      | (d)       | ſΜ       | ILT2L                       | A-21    |      |
|       |           |                                                      |               |                  |           |            |                                   | 11 7714   | 43 mile   | 7130     | 110 9                       | WW.     |      |
|       |           |                                                      |               |                  |           |            |                                   |           |           |          |                             |         |      |
| -     |           | STATE OF THE PARTY.                                  |               |                  |           |            |                                   |           |           |          |                             |         |      |
| Sr    | 15.       | 16. 17.                                              | 18. 19        | 100              | 100000    |            | M. 3. 10                          |           |           |          | 7 8                         |         |      |
| Ans   | Night .   | -                                                    |               | 20.              | 21.       | 22. 2      | 3. 24.                            | 25.       | 26.       | 27.      | 28.                         | 29.     | 1    |
| 171   |           | ca                                                   | a c           | c                | d         | b          | a d                               | b         | a         | d        | STATE STATE OF THE PARTY OF |         | 4    |
|       | 1 4       |                                                      |               | FOR THE STATE OF | 123       |            | 1 4                               | 10        | a         | u        | C                           | Ь       |      |
| IID(  | 'AT DD    | The second second                                    | A             | The Land House   |           |            |                                   |           |           |          |                             |         |      |

ELECTROMAGNETISM

| UNIT 08                                             |                      | ROMAGNETISM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | THE PERSON NAMED IN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           | Zayan Publish      |
|-----------------------------------------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------|
| 30. If a charge particle                            | enters in a region   | on where electric                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | and   | magnetic field ar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | e para    | illel to its motio |
| then it will:                                       |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) Deflect upw                                     | ards                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ,     | Deflect downward                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                    |
| (c) Speed up                                        |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | d)    | Speed down                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                    |
| 1. Magnetic field is ver                            | y strong where       | field lines are:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) Zaro                                            | (b) Fai              | r apart (6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | c)    | Very close                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (d)       | None of these      |
| 2. If magnetic field is                             | loubled then m       | agnetic energy de                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ensit | y becomes:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                    |
| (a) Four times                                      |                      | (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | b)    | Two times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |                    |
| (c) Three times                                     |                      | (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | d)    | Six times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Torred or |                    |
| 3. An object has mass                               | and charge. It       | is moving in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | dir   | rection of some ti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | eld. W    | hich type of fie   |
| exerts a force on the                               | object?              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) Electric and a                                  | nagnatic fields o    | only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (b) Magnetic and                                    | gravitational fie    | elds only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (c) Electric and g                                  | ravitational fiel    | ds only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (d) Electric, mag                                   | netic and gravita    | ational fields                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       | to different of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 41.       | 1-1-0              |
| 4. When a charge par                                | rticle enters in     | the magnetic fie                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | eld   | perpendicular to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | the v     | elocity of char    |
| followed path is:                                   | and to be the same   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       | pur de l                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (4)       | Theread at         |
| (a) Circular                                        | (b) Pa               | arabolic (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | c)    | Elliptical                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (a)       | Hyperbolic         |
| 5. If magnetic field is                             | given by B=(2i       | +3j-8k) and a loo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | p or  | area 10 m is pia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | icea in   | neid in y-z pia    |
| max flux will be:                                   |                      | To Planting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       | 20 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (4)       | 90b                |
| (a) -20 wb                                          | (b) 30               | ) wb (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (c)   | 20 WD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (a)       | 80 WD              |
| 6. e/m =                                            |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) mv/Br                                           | (b) v/               | Br (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c)   | r/Bv                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           | B/vr               |
| 7. What is the angular                              | frequency dur        | ing the circular n                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | noti  | on when a charge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | qıs n     | noving in magn     |
| field B.                                            |                      | Unit with promi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (1)       | am D               |
| (a) qm/B                                            | (b) qF               | 3/m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (c)   | m/qB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           | qmB                |
| 3. The strength of the                              | magnetic field       | at a point r near a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | a loi | ig straight currer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | it carr   | ying wire is it.   |
| field at a distance $\frac{r}{2}$                   | will be:             | and because their                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) B                                               | $(b)$ $\frac{B}{}$   | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (c)   | 2B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (d)       | 4B                 |
| (a) $\frac{B}{2}$                                   | (0) 4                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| 9. An electron is movi                              | ng along negat       | ive x-axis. To get                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | It I  | noving on an and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1-CIOCI   | twise circuia. I   |
| in x-y plane, a magn                                | etic field is app    | olled:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (h)   | Along negative-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ivis      |                    |
| (a) Along positi                                    | ve y-axis            | THE RESERVE OF THE PARTY AND ADDRESS OF THE PA |       | Along negative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                    |
| (c) Along positi                                    | ve z-axis            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (u)   | Along hegative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                    |
| . Magnetic flux will b                              | e maximum wi         | ien:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) Angle betwee                                    | n B and A is 45      | araa A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       | STATE OF STA |           |                    |
| (b) B lies paralle                                  | to the plane of      | and of oran A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (c) B lies perpen                                   | ALEXANDER CONTRACTOR |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (d) B is a null ve                                  | ctor                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       | etic field of 5 T a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | t an a    | ngle of 30°. If fo |
| (d) B is a null ve                                  | d with 20 ms         | velocity in a m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | agn   | Cahanga will ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | The second         |
|                                                     |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) $1.6 \times 10^{-19}$                           | C (b) 2.             | $7 \times 10^{-19}$ C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (c)   | 4.8 × 10 ° C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (u)       | . then maxim       |
| (a) $1.6 \times 10^{-17}$<br>2. An electron is movi | ng along the li      | ne of force in ma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | gne   | tic field B with v                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | elocity   | u, then maxin      |
| force acting on the c                               | harge is given       | by                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                    |
| (a) D                                               | (b) D                | ula l                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (c)   | Bq/u                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (d)       | O shiping          |
| 3. If magnetic field vec                            | tor is $B = (i+2i)$  | +k) and area vec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | tor   | is (2i+j+k) then fl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ux rela   | ated to this is:   |
|                                                     |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4 45      | 7 11/6             |
| (a) 4 Wb                                            | (b) 5 1              | Wb .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c)   | 6 Wb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (d)       | 7 Wb               |

| (2   | a) 4 | Wb    |     | (b)   | 5 W | b   |     | . (c) | 6 Wb |     | ,     | u) ' |           |
|------|------|-------|-----|-------|-----|-----|-----|-------|------|-----|-------|------|-----------|
| Sr.  | 30.  | 31.   | 32. | 33.   | 34. | 35. | 36. | 37.   | 38.  | 39. | 40.   | 41.  | 42. 43    |
| Ans: | c    | c     | a   | a     | a   | c   | b   | b     | c    | С   | С     | d    | a 0       |
| MDCA | TPRI | P BOO | )K  | 11/10 |     | 354 |     | - 151 | By   | AZH | AR IQ | BAL  | 0336-7098 |

|       | miner is per            | rotates in a uniform magnetic field of 0.2 T. If | the loop rotate |
|-------|-------------------------|--------------------------------------------------|-----------------|
| piane | is normal to the field: |                                                  | with loop wife  |
| 12    |                         |                                                  |                 |

(a) 0.01 Wb (b) 0 Wb (c) 8.66x10⁻³ Wb (d) 0.86 Wb

2. If a charge of 2C is travelling parallel to a magnetic field of 4T with 20 m/s. Calculate the net

(a) 160 N (b) 120 N (c) 0 N (d) 100 N

3. A rectangular loop of dimension 3 cm by 5 cm is placed perpendicular in uniform magnetic field of 0.1 T, find the magnetic flux through the loop

(a) 1.5 wb (b) 0.015 wb (c) 0.15 wb (d) 0.00015 Wb

4. If a proton, alpha particle and photon moving with same velocity enter in uniform magnetic field then which particle will deflect more.

then which particle will deflect more

(a) Proton

(b) Alpha particle

(c) Photon

(d) All of these

5. A charge is moving with velocity v, it enters a uniform magnetic field B. The direction v is

perpendicular to B. What is the path of the charge particle inside the magnetic field?

(a) Parabolic (b) Circular (c) Parallel to v (d) Parallel to E

6. If a charge of 2C is moving with 5m/s enter at 30° in 3T, calculate the force experienced by it:

(a) 10N

(b) 15N

7. The unit of magnetic flux is:

(c) 20N (d) 30N

(c) Gauss

(a) Tesla (b) Weber

8. Ampere's law gives us the relationship between:

(a) Force and velocity of charge (b) Force and magnitude field

(c) Current and force (b) Force and magnitude field (d) Current and magnetic field

| Sr.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | STREET, STREET, | DEED SHOWING | O Proposition | Test I | The state of the s |    |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------|---------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| Ans: b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Can de          | 3.           | 4.            | 5.7    | 6.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 7. | 8. |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | c               | d            | b             | b      | Ь                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Ь  | d  |
| THE RESERVE OF THE PARTY OF THE |                 |              |               |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    | -  |

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(d) Henry

9. The diagram shows a small magnet hanging on a thread near the end of a solenoid carrying steady current I?



What happens to the magnet as the iron core is inserted into the solenoid?

- (a) It moves towards the solenoid
- It moves away from the solenoid
- It moves towards the solenoid and rotates through 180°
- (d) It moves away from the solenoid and rotates through 180°

10. For which value of " $\theta$ " between plane area of a coil and  $\vec{B}$ , flux reduces to  $\frac{\sqrt{3}}{2}$  times its maximum

- (a) 30°
- (c) 45°

11. A proton is moving with velocity  $\vec{v}$  in a direction opposite to the direction of magnetic field  $\vec{B}$ . The magnetic force experienced by the proton is:

- (a) Bev
- (b) -Bev
- (c) By
- (d) Zero

12. The magnetic force on a current carrying conductor of length L, carrying total no. of charges "nAL", each charge of value "q" is given as:

- (a)  $\vec{F} = q(\vec{v} \times \vec{B})$
- (b)  $\vec{F} = \text{gLA}(\vec{v} \times \vec{B})$  (c)  $\vec{F} = \text{gnAL}(\vec{v} \times \vec{B})$  (d)  $\vec{F} = \text{nAg}(\vec{v} \times \vec{B})$

13. The magnetic flux is minimum when angle between magnetic field and plane area is:

- (a) 0°
- (b) 30°
- (c) 60°

14. A particle moving in a magnetic field increase its velocity then its radius of the circle:

- (a) Decreases
- (b) Increases
- (c) Remains same (d) Becomes half

15. A proton, a deuteron and an α-particle, having the same kinetic energy, are moving in circular trajectories in a constant magnetic field. If  $r_p$ ,  $r_d$  and  $r_a$  denote, respectively the radii of the trajectories of these particles respectively, then:

- (a)  $r_{\alpha} = r_{p} < r_{d}$  (b)  $r_{\alpha} > r_{d} > r_{p}$
- (c)  $r_{\alpha} = r_{\rm d} > r_{\rm p}$  (d)  $r_{\rm p} = r_{\rm d} < r_{\rm o}$

16. What happens to the magnetic field produce by a solenoid if the number of turns of solenoid and its current are doubled, while its length is quadrupled?

(a) Becomes twice

(b) Becomes quadrupled

(c) Becomes 8 times

(d) Remains same

17. In particle velocity selector method, the selected speed v is given by

18. The force experienced by a charge particle is zero, when charge particle is projected at:

- (a)  $\theta = 0^\circ$
- (b)  $\theta = 90^{\circ}$
- (c)  $\theta = 45^{\circ}$
- (d)  $\theta = 120^{\circ}$

19. A long straight current carrying conductor has current direction from bottom to top when held vertically. What will be the direction of magnetic field lines when observed from top of the conductor?

(a) Clockwise

(b) Vertically upward

(c) Anticlockwise

(d) Vertically downward

20. A proton and α-particle enter a magnetic field normally. If the force experienced by the proton is double of that experienced by  $\alpha$ -particle, the ratio of their speeds is:

- (a) 0.5 (b) 2
- (c) 1

|      |    |     |     |     |     |     |     |     |     |     | THE PERSON NAMED IN COLUMN |
|------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------------------------|
| Sr.  | 9. | 10. | 11. | 12. | 13. | 14. | 15. | 16. | 17. | 18. | 19. 20.                    |
| Ans: | b  | d   | d   | c   | a   | b   | b   | d   | a   | .a  | c b                        |

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21. Protons and α-particles of equal momenta enter a uniform magnetic field normally. The radii of

(c) 0.5

(d) 4

22. One Wb m-2 is equal to:

(a) 1

their orbits will have the ratio:

UNIT 08

- (a)  $10^4$  gauss
- (b) 2 (b) 10⁻² gauss
  - (c) 10² gauss
- (d) 10⁻² 23. A proton is moving with 2x107 ms parallel to a uniform magnetic field of 2.5 T. The magnetic force on the proton is:

(a)  $2.5 \times 10^{-10} \text{ N}$ (b) 8x10-12 N

(c) 8x10-11 N

(d) Zero

24. If an electron is placed in a uniform magnetic field as shown in the figure. Then the direction of force acting on it is:



- (a) Upward
- (b) Downward
- (c) Out of the paper
- 25. A charge of 1C is moving in a magnetic field 0.5 T with a velocity of 10 m/s perpendicular to the field. Force experienced is:

(a) 5 N

(a) East

- (b) 10 N
- (c) 0.5 N
- (d) 0 N
- 26. A moving charge will gain energy due to the application of: (a) Electric field
  - (b) Magnetic field (c) Both of these
- 27. An electron is moving in the north direction. It experiences a force in vertically upward direction.
  - The magnetic field at the position of the electron is in the direction of: (b) West
- (c) North 28. A proton moving with velocity v is acted upon by electric field E and magnetic field B. the proton will move undeflected if:
  - (a) E is perpendicular to B

- (b) E is parallel to v and perpendicular to B
- E, B and v are mutually perpendicular and (d) E and B both are parallel to v
- 29. A strong magnetic field is applied on a stationary electron, then:
  - (a) Electron moves in the direction of field (c) Electron remains stationary
    - (b) Electron moves in opposite direction

- (d) Electron starts spinning
- 30. The current is flowing in south direction along a power line. The direction of magnetic field above the power line is: (a) South (b) East (c) North
- 31. A bar magnet is moved at a steady speed of 2 ms-1 towards a coil of wire which is connected to a galvanometer. The magnet is now withdrawn along the same path at 4 m/s. The deflection of the
  - (a) Same direction as previously, with the magnitude of deflection doubled
  - Opposite direction as previously, with the magnitude of deflection halved
  - Same direction as previously, with the magnitude if deflection halved Opposite direction as previously, with the magnitude of deflection doubled

| Sr. 21.     | 22. | 23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The state of | -   | 1   |     |     |                     |     |     |
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| Ans: b      |     | CONTRACTOR OF THE PARTY OF THE | Selection .  | 25. | 26. | 27. | 28. | 20                  | 30  |     |
| 0           | a   | d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | d            | A   | -   |     | -   | Service Control Con | 30, | 31. |
| NMDCAT PREP |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |     | a   | a   | C   | C                   | d   | a   |

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|------------|-----------------------------------------|----------|-------------------------|---------------|---------------------------------|------------|-------------------------|
|            | naximum magnetic                        | force    | acting on a cl          | harge. Now    | if we change th                 | e directi  | on of velocity of       |
| charge     | naximum magnetic<br>e and it makes an a | ngle of  | 45° with mag            | netic field t | then the force bed              | omes.      | Alberta Bridge F        |
| (a)        | n                                       | (b)      | 2F                      | (c)           | F                               | (d)        | $\sqrt{2}F$             |
|            | -                                       |          |                         |               | $\sqrt{2}$                      |            |                         |
| 33. An α-  | particle and proto                      | n havir  | g same mome             | entum ente    | r into the region               | of unifor  | rm,                     |
| perper     | dicular magnetic                        | field. T | he ratio of rac         | dii of curva  | ture of their circ              | ular pat   | hs in the               |
|            | tic field is:                           |          |                         |               |                                 |            |                         |
| (a)        | 1:1                                     | (b)      | 1:2                     | (c)           | 1:4                             | (d)        | 4:1                     |
| 34. A char | ged particle of ma                      | ss m a   | nd charge q de          | escribes cir  | cular motion of i               | radius r   | in a uniform            |
| magne      | tic field of strengtl                   |          |                         | f revolutio   | n is:                           |            | Day of the street       |
| (a)        | $\frac{Bq}{2\pi m}$                     | (b)      | Bq<br>2πrm              | (c)           | 2πm<br>Ba                       | (d)        | 2==                     |
|            | ged particle move                       | with .   | 2πrm                    | uniform m     |                                 | The mag    | netic force             |
|            | enced by the partic                     |          | relocity v in a         | unitor in it  | agnetic new 20                  |            | mette force             |
| (a)        | Always zero                             | cic is.  |                         | (b)           | Never zero                      |            |                         |
| (c)        | Zero if B and V a                       | re perr  | endicular               | 1 3           | Zero, if B and v                | are para   | llel                    |
|            | tic flux is given by                    |          | charcata                | (6)           | 2010111                         |            |                         |
| (a)        | Dot product of m                        |          | field and area          | vector        |                                 |            |                         |
| (b)        | Cross product of                        | -        |                         |               |                                 |            |                         |
| (c)        | Both of these                           | magne    | ic field and an         | cu rector     |                                 |            |                         |
|            | None of these                           |          |                         |               |                                 |            |                         |
|            | e maximum force                         | on the   | conductor h             | wing lengt    | h 60cm, current                 | 2.75 A a   | nd flux density of      |
| 9 units.   | c maximum force                         | on       |                         |               | 41. (4.                         |            | # 1 (B)                 |
| (a)        | 14.8                                    | (b)      | 18.45                   | (c)           | 84.25                           | (d)        | 7.325                   |
|            | urrent passes thr                       | (-)      |                         | it behaves    | like a:                         | blent ou   |                         |
|            | Circular magnet                         |          |                         |               | Bar magnet                      |            |                         |
|            | Loop magnet                             |          |                         | (d)           | Magnetic compa                  | ass        |                         |
| When a     | magnet is moved                         | with i   | ts N-pole tow           |               |                                 |            | meter, the farther      |
|            | he coil acts as:                        |          |                         | S. worth .    |                                 |            |                         |
| (a)        | N-pole                                  | (b)      | S-pole                  | (c)           | May A or B                      | (d)        | None of these           |
| ). An α-n: | article moves at r                      | ight ar  | gles to a unit          | form magn     | etic field of 1.0               | T with a   | speed of 107 ms         |
|            | ce experienced by                       |          |                         |               |                                 |            | Mar (e, see             |
| (a)        | $3.2 \times 10^{-12} \text{ N}$         | (b)      | 8 × 10 ⁻¹³ N | (c)           | $3.2 \times 10^{-11} \text{ N}$ | (d)        | 8 × 10 ⁻¹¹ N |
| An alas    | tron $(mass = 9)$                       | 10-3     | 1 ka charae             | = 1 6 x 1     | (0-19C) moving                  | with a v   | elocity of 106 ms       |
| . An elec  | region where ma                         | amatic   | field exists            | f it describ  | nes a circle of ra              | dius 0.1   | 0 m. the magnetic       |
|            |                                         | ignetic  | neid exists.            | , acseria     | oes a circle of the             |            | (a) 1 led               |
| field mu   | 1.8 × 10 ⁻⁴ T                | (h)      | F 6 × 10-5 7            | (0)           | 144 × 10-5 T                    | (d)        | 13 x 10 ⁻⁶ T |
| (a)        | 1.8 × 10 · 1                            | (0)      | 5.6 X 10                | Foot If it    | nters in a magn                 | etic field | directed upward         |
| Z. An elec | tron is moving ho                       | rizont   | ally towards            | east. If it t | inters in a magn                | ene nen    | the sales as a second   |
|            | e electron will be o                    | leffecto | a in the direc          | ction of:     | Month                           | (4)        | South                   |
| (a)        | East                                    | (b)      | West                    | (c)           | North                           | A.T. wat   | the current mus         |
| S. You are | e asked to design                       | a solei  | old that will           | give a ma     | that colonsider                 | Il bei     | - Inercuraying          |
| not exce   | eed 20A. The num                        | ber of   | turns per uni           | t length of   | that solenoid wi                | II De:     | 125 × 106               |
| (a)        | $3.9 \times 10^4$                       | (b)      | $9.1 \times 10^{3}$     | (c)           | 8.5 × 10°                       | (d)        | 1.25 × 10               |
| Ions of    | different momen                         | ta (p),  | having diffe            | rent charg    | e, enter normal                 | ly to a    | uniform magneti         |
| field. Tl  | he radius of the or                     | bit of   | an ion is prop          | ortional to   | CONTRACTOR OF SERVICE           | Car was    | 20 (1)                  |
| (a)        | p                                       | (b)      | P ²          | (c)           | 9                               | (d)        | 94                      |
| TY STATE   | q                                       |          | q ²          |               | p                               |            | p ²          |

35.

NMDCAT PREP BOOK

36.

37. 38.

39.

40. 41. 42.

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| The me                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| ()                                                                                                                      | straight line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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|                                                                                                                         | Proton will mov                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| ST. PAY                                                                                                                 | electron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| (c)                                                                                                                     | There will not b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| (d)                                                                                                                     | Electron and pro                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| A proto                                                                                                                 | n enters a mag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| angle of                                                                                                                | 30 with the II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | eld. 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                                                                                                                                                                                                                                                                       | (d)                                       | Magnituremains 48. d                                                                                       | de of mo<br>unchange<br>49.<br>c | omentum<br>ed | 50,<br>d                                                                         | ]<br>a |
| A positive directed  (a) (b) (c) (d)  A protoi angle 30                                                                 | wely charged payer tically upw Get reflected we Move in a circu Move in a circu Continue to mo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | PRACe article moving yards The particle upwardlar orbit with ular orbit with ove towards eas a velocity 2.5 netic field. 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| Sr. Ans:  A positive directed  (a) (b) (c) (d) A proton angle 30 (a) An \( \infty \)-pa                                 | wely charged parterically upw Get reflected we Move in a circum Move in a circum continue to move the moving with the mag 3x10 ⁻¹² N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | PRACe article moving rards The particle moving rards The particle robit with post towards east a velocity 2.5 netic field. The (b) 5x1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | towards easticle will:  a towards easticle w | ters a the pro                            | Magnituremains  48. d  NO.: ar a region  magnetic ton is: 6 x10                                            | de of mo<br>unchange<br>49.<br>c | f intens      | 50,<br>d                                                                         | d      |
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| U          | NIT 08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ELE          | CTROMAGNETI                         | SM       | erasis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | المسا     | Zayan Publishe              |
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| 5.         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | lest for     |                                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
| ٥.         | ( ) D (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (b)          | Electron                            | (c)      | β-particle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           | Positron                    |
| <b>5</b> . | El steen and proton of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | equal m      | omentum enter a                     | unifori  | n magnetic field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | normal    | to the lines of             |
| •          | force. If the radii of cur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | vature o     | of circular paths b                 | e re an  | a rp respectively                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | then.     |                             |
|            | CONTRACTOR OF THE PROPERTY OF | (b)          | $\frac{r_e}{r_p} = \frac{m_p}{m_e}$ | (c)      | $\frac{r_e}{}=\frac{m_p}{}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d)       | $\frac{r_e}{}=\frac{m_e}{}$ |
|            | (a) $\frac{r_e}{r_p} = 1$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (0)          | rp me                               | (0)      | $r_{\mu} \sqrt{m_e}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           | $r_p = \sqrt{m_p}$          |
|            | Which of the following of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | loes not     | affect the motion                   | of a m   | oving electron?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (a) Electric field appl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | lied in th   | he direction of mot                 | ion      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (b) Magnetic field ap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | plied in     | the direction of me                 | otion    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (c) Electric field app                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | lied in t    | he direction opposi                 | te of m  | otion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |                             |
|            | (d) Magnetic field ap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | plied pe     | erpendicular to the                 | directio | in of motion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | atia fiel | d P Th                      |
|            | A charged particle mo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ving wi      | th a velocity ve                    | nters a  | uniform magr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | l magna   | tio Gold in                 |
|            | experiences the largest of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |                                     | le betw  | 45°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (d)       | 180°                        |
|            | (a) 0°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (b)          | 900                                 | (c)      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | A proton is moving in a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | circula      | r orbit in a magne                  | etic Hel | d with energy i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Wiev. I   | ne energy of an o           |
|            | particle which resolves i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |                                     | (0)      | 2 MeV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (d)       | 4 MeV                       |
|            | (a) 0.5 MeV<br>A charged particle enter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (0)          | 1 MeV                               | ld per   | endicular to it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                             |
| •          | (a) Increases the kine                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | rs a uni     | orm magnetic ne                     | iu per   | renuicular to it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1.00      | guerre meia.                |
|            | (b) Decreases the kin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | atic and     | gy of the particle                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (c) Changes the direct                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | tion of      | motion of the partie                | icle     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | and the billion bearing     |
|            | (d) Both a and c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | tion or      | motion of the part                  |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | many in the old of the      |
|            | A proton an electron ar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | nd an a      | -narticle accelera                  | ted thr  | ough the same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | potentia  | l difference enter          |
|            | region of uniform magn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | etic fie     | ld, moving at rig                   | ht ang   | le to the magne                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | tic field | . The ratio of the          |
|            | K.E is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (a) 1:1:1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (b)          | 2:2:1                               | (c)      | 2:1:11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (d)       | 1:1:2                       |
|            | The magnetic effect of c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | urrent       | was discovered by                   | y:       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (a) Oersted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (b)          | Faraday                             | (c)      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (d)       | Ohm                         |
|            | The unit of $\vec{E}$ is $NC^{-1}$ ar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | nd that      | of $\vec{B}$ is $NA^{-1}m^{-1}$     | , then t | he unit of E/B i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | s:        |                             |
|            | (a) ms ⁻²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (b)          | $ms^{-1}$                           | (c)      | ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (d)       | $m^{-1}s^{-1}$              |
|            | A charged particle enter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | rs in a s    | trong magnetic fi                   | eld. Th  | en its kinetic er                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | nergy     |                             |
|            | (a) Increases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | and the same of                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (b) Remains constant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |                                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | are mile  |                             |
|            | (c) Decreases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              |                                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | (d) First increases and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | d then b     | ecomes constant                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | Magnetism is related to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |                                     |          | Committee of the commit |           |                             |
|            | (a) Stationary charg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | E PARTY OF THE                      | (b)      | Accelerated cl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | narges    |                             |
|            | (c) Moving charges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | and the same |                                     | (d)      | All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           | my dimention                |
|            | Electronic current is flo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | wing t       | hrough a straigh                    | t cond   | uctor as shown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | in figur  | re. The direction           |
|            | magnetic lines of force v                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | vhen se      | en from below the                   | e condi  | uctor will be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |                             |
|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |                                     |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            | White the same of |              | (•)                                 |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |
|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              | and the same                        | 100      | Tout better                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (4        | Bottom to top               |
|            | (a) Clockwise                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (b)          | Anticlockwise                       | (c)      | Top to bottom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | varde n   | orth by a magne             |
|            | A positively charged pa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | rticle       | projected toward                    | s west   | is deflected to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | wards II  | orth by "                   |
|            | field. The field must be:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |                                     |          | Towards south                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DET BUILD | The second                  |
|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              | Unward                              |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |                             |

MDCAT PREP BOOF

UNIT 08 **ELECTROMAGNETISM** 18. The force on a charge moving in a magnetic field is not independent of: (a) Area of conductor (b) The momentum of the particle (c) The intensity of the field (d) Both a and b 19. The value of permeability of free space is: (a)  $10^{-7}\pi mA^{-1}$ (b)  $4\pi \times 10^{-7} \text{T m} A^{-1}$ (c)  $2\pi \times 10^{-7} T mA^{-1}$ (d)  $4\pi \times 10^7 T mA^{-1}$ 20. Magnetic flux is maximum when angle is: (b) 90° (c) 120° (d) All of these 21. Strength of magnetic field is called (a) Strength Magnetic flux (d) Density density 22. Magnetic field lines created by current carrying wire is (a) Helical (b) Elliptical (c) Hyperbolic (d) · Circular 23. Magnetic flux is scalar product of (a)  $\vec{B}$  and  $\vec{V}$ (b) q and A (c) I and I (d) None of these 24. Magnetic field will not produce in case of (a) Charged positive particles (b) Charged negative particles (c) Neutral particles (d) All of these 25. Magnetic field along the axis of solenoid with n turns per unit length carrying current I is given (a)  $B = \mu_0 nI$  (b)  $B = \mu_0 N/L$ 26. Do magnetic flux lines intersect? (a) Yes (b) No (c) Depends on strength of field (d) Cannot be determined 27. Find the force due to a current element of length 2 cm and flux density of 12 tesla. The current through the element will be 5A. (a) 1N (b) 1.2N (c) 1.4N (d) 1.6 N 28. Magnetic flux is zero: (a) When angle is 90 (b) Angle is 0 (c) Angle is 180 (d) None of these 29. A square loop of side 2 m is place in a 5T of magnetic field. What will be the related flux? (a) 2.5 Weber (b) 5 Weber (c) 10 Weber (d) 20 Weber 30. Find the Lorentz force of a charge 2.5C having an electric field of 5 units and magnetic field of 7.25 units with a velocity 1.5m/s: (a) 39.68 (b) 68.93 31. Force acting on a negative charge is always (a) In the direction opposite to electric field (b) In the direction of electric field (c) In the direction perpendicular to electric field (d) In the direction perpendicular to the velocity of charge 32. Unit of relative permeability is (a) Henry (b) Henry/m (c) Dimensionless (d) Henry/sq.m 33. Work done by the magnetic force on charged particle in presence of perpendicular magnetic field (a) Positive (b) Zero (c) Negative (d) None of these

UNIT 08

PRACTICE TEST NO.4

| 4. A charged particle is moving on circular path with velocity of the charged particle is doubled and strength of magnetic field is halved, then radius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | PRACTICE TEST NO.4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| velocity of the charged particle is deadless.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1. A proton moving with a constant velocity passes through a region of space without any change in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| becomes: (a) 8 times (b) 2 times (c) 4 times (d) 16 times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | its velocity. If E and B represent the electric and magnetic fields respectively, then this region of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (a) 8 times (b) 2 times (c)  5. What happens to the flux if applied magnetic field is doubled on the same surface?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | space may have:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 5. What happens to the flux it applied magnetic flux (b) Becomes twice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $\Gamma = \Lambda P = \Lambda$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (a) Become nan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Becomes infinite (d) Becomes 4 times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2. An electron is travelling horizontally towards east. A magnetic field is vertically downward                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 6. Force experienced by charge particles in magnetic field is (b) Perpendicular to yelocity (c) Becomes a minute of the particles in magnetic field is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | direction exerts a force on the electron along:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Perpendicular to velocity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (a) East (b) West (c) North (d) South                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (c) Parallel to field (d) Perpendicular to velocity and field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 3. A proton and an electron both moving with the same velocity v enter into a region of magnetic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 7 Do magnetic flux lines intersect?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | held directed perpendicular to the velocity of the particles. They will now in circular orbits such                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (a) Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | tuation and the second  |
| D do no attenuate of field (d) Cannot be determined                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (a) Their time period will be same (b) Time period of proton will be higher                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Two greaticles have the ratio of their velocities as 3 : 2 on entering the field. If they move in                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (c) Time period for electron will be higher (d) Their and in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| different circular paths, then the ratio of the radii of their paths is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4. An electron enters a magnetic field whose direction is perpendicular to the valueity of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (a) 2:3 (b) 3:2 (c) 4:9 (d) 9:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| If the direction of the field and area vector is opposite then flux is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (a) Speed of electron will increase (b) Speed of electron will be decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (c) Negative (u) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Positive (b) Leto  A 3 cm wire carrying a current of 10A is placed a long along axis inside a solenoid of magnetic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5. An electron and a proton enter a magnetic field perpendicularly. Both tons was the same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| field 0.35 T. The net force felt by wire is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (a) Trajectory of electron is less curved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (a) 11.5 N (b) 0.105 N (c) 9.5 N (d) Zero  Consider a charge q is placed in a region where both electric and magnetic fields are present. The                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (b) Trajectory of proton is less curved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| . Consider a charge q is placed in a region where both electric and a region where the region | (c) Both trajectories are equal curved                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| charge will experience:  (a) Both electric and magnetic forces  (b) Only electric force                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (d) Both move on straight line path                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (a) Don't electric und magnetic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6. A charge moves in a circle perpendicular to a magnetic field. The time period of revolution is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (c) Only magnetic force (d) No force at all                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | independent of:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Only magnetic force (d) (d) (d) (e) (e) (e) (e) (f) (e) (f) (f) (f) (f) (f) (f) (f) (f) (f) (f                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (a) Magnetic field (b) Charge (c) M. St.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| (a) 10 Wb (b) 15 Wb (c) 20 Wb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (a) Magnetic field (b) Charge (c) Mass of the particle (d) Velocity of the particle  7. If an electron is going in the direction of magnetic field P. (d) Velocity of the particle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Current and induced magnetic field are always:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7. If an electron is going in the direction of magnetic field B with the velocity of v then the force on                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| (a) Perpendicular (b) Parallel (c) Circular (d) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| A solonoid bent into a circle is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Inductor (d) Tuloid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 8. An electron is travelling in east direction and a magnetic field is applied in upward direction then                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (a) Resistor (b) Capacitor (c) Inductor  5. Force on a moving charge in a uniform magnetic field will be maximum, when angle between v                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (a) C 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9. If call South (b) North (c) West (d) East                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| and B is (a) 0 (b) 30 (c) 60 (d) 90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | take the rays are projected at right angles to a magnetic field their trajectory is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (a) 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | (a) Ellipse (b) Circle (c) Parabola (d) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6. Magnetic flux is product. (a) Scalar (b) Vector (c) Simple (d) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10. The radius of curvature of the path of a charged particle in a uniform magnetic field is directly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (a) Scalar (b) Vector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | proportional to the:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 7. 1 tesla is equal to: (b) 1 N/Am (c) 0.1 Nm/A (d) 1 Nm/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (a) Charge of the particle (b) Momentum of the particle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (a) 100 N/Am (b) 1 N/Am (c) 0.1 Nm/A (d) 1 Nm/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (c) Energy of the particle  11. A charged particle arterial particle (d) Strength of the field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (a) 100 N/Am (b) 1N/Am (c) 1N/Am (c) 1N/Am (d) 100 N/Am (e) 1N/Am (e) 1N/Am (e) 1N/Am (f) 1N/Am  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | from the direction of the field. Which (one or more) of the following characteristics of the particle is same with time?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| to D. A separation attacks conductor the difference between magnetic field lines;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | is same with time?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| (a) Increases away from conductor (b) Decreases and then increases towards conductor (c) Increases towards conductor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c) Acceleration (b) Kinetic energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (c) Microsco to the assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 12. The value of permeability of free annual (d) Direction of motion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 50. Magnetic field strength is measure in: (a) Whm ² (b) Wbm ² (d) Wb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Wbm ⁻¹ (b) Wbm ⁻² (c) Wbm ² (d) Wb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (a) $10^{-7} \text{ TmA}^{-1}$ (b) $4\pi \times 10^{-7} \text{ TmA}^{-1}$ (c) $2\pi \times 10^{-7} \text{ TmA}^{-1}$ (d) $4\pi \times 10^{7} \text{ TmA}^{-1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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| Sr. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 47. 46. 43. b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | b c b d a b d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Ans: c b d b b c d a c a d d a b d a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| NMDCAT PREP BOOK 362 By AZHAR IQBAL 0336-7098894                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | By AZHAR IQBAL 0336-7098894                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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13. A negative charge moving with constant velocity v enters a region of uniform magnetic field pointing into the page. What is the direction of the magnetic force on the charge?

x x x x

(a) Left wards

(b) Right wards

(c) To the bottom of page (d) To the top of page

14. An electron is injected into a uniform magnetic field with components of velocity parallel to and normal to the field direction. The path of the electron is a:

(a) Helix

(b) Circle

(c) Parabola (d) Straight line

15. The unit of magnetic flux is

(a) Weber

(b) Wb m⁻³

(c) Henry (d) A m⁻¹

16. The magnetic field inside a solenoid is:

(a) Zero

(b) Non-uniform

(c) Infinite (d) Uniform

17. An electron enters the magnetic field from right towards left, B is into paper. The electron will be deflected:

(a) Upward

(b) Downward

(c) Toward (d) None of these

18. Magnetic flux, mathematically is defined as:

(a)  $\emptyset = \vec{B} \cdot \vec{A}$ 

(b)  $\emptyset = \vec{E} \cdot \vec{A}$ 

(c)  $\emptyset = \vec{B} \times \vec{A}$  (d)  $\emptyset = \vec{E} \times \vec{A}$ 

19. The e/m of an electron moving in a circular path in a magnetic field in terms of velocity v radius r and magnetic field B is given by:

Br

 $B^2r$ 

20. A vertical wire carries an electronic current into the page. What is the direction of magnetic field at point P located as shown?



(a) West (b) East

(c) North

21. A magnetic field:

(a) Always exerts a force on a charged particle

(b) Never exerts a force on a charged particle

(c) Exerts a force, if the charged particle is moving across the magnetic field lines

(d) Exerts a force, if the charged particle is moving along the magnetic field lines

is correct relation (T = testa and G = gauss):

(a)  $1T = 10^4$ G

(b)  $1T = 10^{-2}G$ 

(c)  $1T = 10^{-4}G$  (d)  $1T = 10^2G$ 

23. While finding the radius of circular path in the experiment to find e/m of electron, the glass tube is filled with:

(a) H₂

(b) He (c) O₂

(d) CO₂

|      |     |     |     |     |     |     |     |     |     | 23.     |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|---------|
| Sr.  | 13. | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. 23. |
| Ans: | b   | a   | a   | d   | a   | a   | a   | b   | С   | a       |

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By AZHAR IQBAL 0336-7098894

ELECTROMAGNETISM 24. The magnetic field due to a current-carrying solenoid which has 'n' number of turns per unit

length is:

UNIT 08

(b)  $B = \mu_0 n^2 I$  (c)  $B = \frac{\mu_0 n I}{\ell}$ 

25. A very long solenoid has 400 turns per meter length of the solenoid. A current of 1.6A flows through it. Then the magnetic induction at the middle point of the solenoid on its axis, is approximately:

(a)  $16 \times 10^{-4} \text{ T}$ 

(a)  $B = \mu_0 nI$ 

(b)  $32 \times 10^{-4} \text{ T}$  (c)  $8 \times 10^{-4} \text{ T}$  (d)  $4 \times 10^{-4} \text{ T}$ 26. Two particles A and B of mass mA and mB respectively and having the same charges are moving in a plane. A uniform magnetic field exists perpendicular to this plane. The speed of the particles are vA and vB respectively and the trajectories are shown in the figure. Then:



(a)  $m_A v_A < m_R v_B$ 

(b)  $m_A v_A > m_B v_B$ 

(c)  $m_B > v_A$  and  $v_A = v_B$ 

(d)  $m_A = m_B$  and  $v_A = v_B$ 

27. A cable carries a current of 2 A vertically downward. The magnetic field produced by it at a point 10 cm north will be:

(a)  $2 \times 10^{-6}$  tesla west

(b)  $2 \times 10^{-6}$  tesla east

(c)  $4 \times 10^{-6}$  tesla west

(d)  $4 \times 10^{-6}$  tesla east

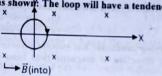
28. What is the magnetic force on a stationary charged particle in a uniform magnetic field?

(a) Zero (b) F=qvB (c)  $F=q(v\times B)$ (d) F=ILBsinθ

29. A current is flowing towards North along a power line. The direction of magnetic field above it, neglecting the earth's field, is:

(a) North

(b) South (c) East (d) West 30. A conducting loop carrying electronic current I is placed in a uniform magnetic field pointing into plane of the paper as shown. The loop will have a tendency to:



(a) Contract

(b) Expand

(c) Move towards x- (d) Move towards yaxis

31. Magnetic flux density is defined in terms of:

(a) Tesla

(b) Wbm⁻²

32. The imaginary closed path around a current conductor at which magnetic induction is to be  $N m^{-1} A^{-1}$ 

(a) Amperian path

(c) Gaussian surface

(b) Amperian surface

33. During the circular path in magnetic field, what is the magnetic force

27. c

(b)  $F = qB^2$ 

(d) F = qvB

34. The magnetic field is parallel to a surface, then the magnetic flux through the surface is: (b) Small but not zero (c) Infinite (d) Larger than 1

NMDCAT PREP BOO

35. 'F' is maximum force acting on a conductor. Now if we change the direction of conductor by making an angle of 45° with the magnetic field then the force becomes:

(a)

(c) 2F

- (d)  $\sqrt{2}$  F
- 36. If we doubled all the parameters of the force acting on current carrying conductor and  $\theta = 900$ then magnetic force becomes:
- (a) Double

(b) Four times

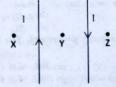
- (c) 8 times
- (d) 16 times
- 37. What happens to the magnet as the iron core is inserted into the solenoid? (a) It moves towards solenoid and rotates (b) It moves towards the solenoid

through 180°

(c) It moves away from solenoid

(d) It moves away from solenoid and rotates through 180°

38. Two long straight parallel wires held vertically have equal but opposite currents as shown in the



#### Which of the following effect will be observed?

- (a) Magnetic field at 'X' is stronger than that at 'Y' and 'Z'
- (b) Magnetic field at 'Y' is weaker than that at 'X' and 'Z'
- (c) Magnetic field at 'X', 'Y' and 'Z' is same
- (d) Magnetic field at 'X' is weaker than that at 'Y' but stronger than that at 'Z'
- 39. A solenoid is cut into two halves. Magnetic induction due to same current in each half will be:
  - (a) Half of the original

(b) Double of the original

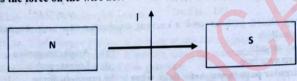
(c) Same as original

- (d) Four times of the original
- 40. A long straight current carrying conductor has current directed from bottom to top when held vertically. What will be the direction of magnetic field lines when observed from below the conductor?
  - (a) Clockwise

Anti clockwise

(c) Vertically upward

- (d) Vertically downward
- 41. The diagram shows a wire, carrying a current 'I', placed between the poles of magnet: In which direction does the force on the wire act?



- (a) Towards the 'N' pole of the magnet
- Downwards

(c) Upwards

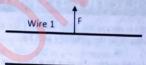
Towards the 'S' pole of the magnet

|      |     |     |     |     | 2-7-7-1 | 41.   |  |
|------|-----|-----|-----|-----|---------|-------|--|
| Sr.  | 35. | 36. | 37. | 38. | 39.     | 40. b |  |
| Ans: | b   | c   | a   | b   | c       | a     |  |

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- 42. If the number of turns of a solenoid circular coil is doubled, but the current in the coil and radius of the coil remains same, then what will be the magnetic flux density produced by the coil?
  - (a) Magnetic flux density will be halved.
  - (b) Magnetic flux density increases by different amount at different points
  - (c) Magnetic flux density remains unchanged
  - (d) Magnetic flux density will be doubled
- 43. Two long parallel wires Wire 1 and Wire 2 repel each other as shown in the figure. What could



Wire 2

- Both carry current in same direction
- (b) Both carry current in opposite direction
- Wire 1 has current, but Wire 2 has no (d) Wire 2 has current, Wire 1 has no current
- 44. A 10 cm long solenoid has 100 turns. What will be the magnetic field inside it along its axis if one micro ampere current is passed through it?
  - (a)  $4\pi \times 10^{-13}$  telsa (b)  $4\pi \times 10^{-7}$  telsa

- (c)  $4\pi \times 10^{-10}$  telsa (d)  $4\pi \times 10^{-16}$  telsa 45. Two  $\alpha$ -particles have the ratio of their velocities as 3 : 2 on entering the magnetic field. If they move in different circular paths, then the ratio of the radii of their paths is
  - (a) 2:3

UNIT 08

- (b) 3:2
- (c) 4:9
- 46. A solenoid 15.0 cm long has 300 turns of wire, a current 5 A flows through it. The magnitude of magnetic field inside the solenoid is:
  - (a)  $1.256 \times 10^{-7} Wbm^{-2}$ (c)  $1.256 \times 10^{-2} Wbm^{-2}$

- (b)  $1.256 \times 10^{-5} Wbm^{-2}$
- (d)  $1.256 \times 10^{-7} Wbm^{-2}$ 47. A long solenoid has magnetic field strength of  $3.14 \times 10^{-2} T$  inside it when a current of 5 Apasses through it. The number of turns in 1 m of the solenoid is:
  - (a) 1000
- (b) 5000
- (d) 10000
- 48. Force on current carrying conductor per unit length is given by: (a) IL  $\sin \theta$  (b) ILB
- (c) IL
- (d) IB  $\sin \theta$
- 49. If a charge q is moving in a velocity selector. The charge will move in a straight path if:
- (b) E is perpendicular to B. (c)
  - $F_m = F_e$
- (d) All of these
- 50. A charge particle is moving in a circular path in a perpendicular magnetic field. By increasing the magnetic field charge to mass ratio of the particle will:
  - (a) Increase
- (b) Decrease
- (c) Remain same
- (d) None

| Sr.         | 42.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 43 | 44                  | No. |     |     | 1. 1. d. 184 | THE ALLE |     |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------|-----|-----|-----|--------------|----------|-----|
| Sr.<br>Ans: | d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | d  | and the same of the | 45. | 46. | 47. | 48.          | 49.      | 50. |
|             | No. of Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other party of the Concession, Name of Street, or other pa | u  | C                   | Ь   | С   | b   | a            | d        | С   |

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UNIT 09 >>

# **ELECTROMAGNETIC INDUCTION**

### PRACTICE TEST NO. 1

| 1. | In a transformer 220 | ac voltage is increased<br>imber of turns in the pr | 2200 volts. If the nun<br>imary will be: | nber of turns in the secondary                    |
|----|----------------------|-----------------------------------------------------|------------------------------------------|---------------------------------------------------|
|    | (-) 200              | (b) 100                                             | (c) 50                                   | (d) 20 agnetic field of intensity 10 ³ |

Wbm-2. The magnetic flux through the coil is:

(a) 10 weber

(b) 10⁻⁵ weber

(c) 105 weber

(d) 100 weber

3. A coil having an area 2m2 is placed in a magnetic field which changes from 1 Wbm2 to 4 Wbm2 in a interval of 2 s. The emf induced in the coil will be:

(b) 3V

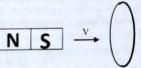
4. To induce an emf in a coil, the linking magnetic flux:

(c) 1.5 V

(a) Must decrease (c) Remain constant (b) Can either increase or decrease (d) Increase

5. In the diagram shown if a bar magnet is moved along the common axis of two single turn coil A and B in the direction of arrow then:





Current is induced only in A and in B

(b) Induced currents in A & B are in same direction

(c) Current is induced only in A and not in B

Induced currents in A & B are in opposite directions

6. An aeroplane in which the distance between the tips of wings is 50 m is flying horizontally with a speed of 360 kmh⁻¹ over a place where the vertical components of earth magnetic field is 2 x 10⁻⁴ Wbm⁻². The potential difference between the tips of wings would be:

(a) 0.1 V

(b) 1.0 V

(c) 0.2 V

(d) 0.01 V

7. A coil of N turns and mean cross-sectional area A is rotating with uniform angular velocity  $\omega$ about an axis at right angle to uniform magnetic field B. Then the emf developed between the centre and the rim of the plate is:

(a) NBA sin ωt

(b) NB ωsin ωt

(c)  $\frac{\pi b}{4} \sin \omega t$ 

(d) NBA ω sin ωt

8. The core of a transformer is assembled with laminated plates to reduce energy losses due to:

(a) Eddy current

(b) Hystersis

Resistance in winding

(d) None of these

9. What is increased in step-down transformer?

(a) Voltage

(b) Current

(c) Power

(d) Current density

| Sr.      | 1.      | 2. | 3. | 4.  | 5. | 6. | 7.    | 8.    | 9.          |
|----------|---------|----|----|-----|----|----|-------|-------|-------------|
| Ans:     | a       | a  | b  | b   | d  | b  | d     | a     |             |
| DCAT PRI | ЕР ВООК |    |    | 368 |    | Ву | AZHAR | IQBAL | 0336-709889 |

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| ELECT | ROMA | GNETIC | INDUC | TION |
|-------|------|--------|-------|------|

10. The ratio of secondary to the primary turns in a transformer is 3:2. If the power output be P, then the input power neglecting all losses will be equal to:

(a) 5P

UNIT 09

(b) 1.5 P

(d) 16 amp

11. A 100% efficient transformer has 100 turns in the primary and 25 turns in its secondary coil. If the current in the secondary coil is 4 amp, then the current in the primary coil is: (b) 4 amp

(a) 1 amp

12. A transformer is used to:

(a) Change the alternating potential

(c) Prevent the power loss in alternating current flow

(b) Change the alternating current

(d) All of these

(c) 8 amp

13. The induced emf in a coil having 'N' number of loops is equal to N tims the negative of the rate of change of magnetic flux linked with coil, is a statement of:

(a) Lenz's law

(b) Ohm's law

(c) Faraday's law

(d) Coulomb's law

14. Maximum motional emf in a conductor is given as:

(a)  $\varepsilon = -vBL\sin\theta$ 

(b)  $\varepsilon = -v^2 B L$ 

(c)  $\varepsilon = -vBL\cos\theta$ 

(d)  $\varepsilon = -vBL$ 

15. Carbon brushes in A.C generator are:

(a) Moving

(b) Stationary

Sometimes moving & sometimes stationary

(d) Moving with increasing speed

16. In A.C generator if plane of coil is parallel to magnetic field, the emf induced is:

(a)  $\varepsilon = N\omega A$ 

(b)  $\varepsilon = Zero$ 

(c)  $\varepsilon = N\omega AB$ 

(d)  $\varepsilon = NfAB \sin \theta$ 

17. The angular frequency of armature coil is if A.C generator produces current of 50 Hz frequency:

(a)  $50 \pi$ 

(b)  $200 \pi$ 

(c) 100 m

(d) 25 m

18. A wire loop is rotated in a uniform magnetic field about an axis perpendicular to the field. The direction of the current induced in the loop reverses once each:

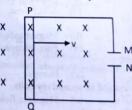
(a) Ouarter revolution

(c) Half revolution

(b) Full revolution

(d) Two revolution

19. A rod PQ is connected to the capacitor plates. The rod is placed in a magnetic field (B). If the rod is pulled out of magnetic field with velocity  $\vec{v}$  as shown:



(a) Plate M will be negatively charged (c) Plate N will be negatively charged

(b) Both plates will be similarly charged

(d) No charge will be collected on plates 20. A rectangular coil of 100 turns and size  $0.1 m \times 0.05 m$  is placed perpendicular to a magnetic field of 0.1 T. The induced emf when the field drops to 0.05 T in 0.05 s is:

(a) 0.5 V

(b) 0.25 V

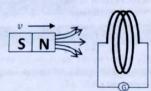
(c) 1.0 V

(d) 2.0 V

Sr. 14. 17. 19. 20. Ans: d

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- (a) The flux linked is more
- (c) The rate of change of flux is increases
- (b) There is no change in the flux
- (d) None of these
- 22. A magnet is placed along the axis of circular coil. The magnet is moved towards the coil. The induced current in coil (as viewed from left side of circular coil is) is:



- (a) Zero
- (c) Anticlockwise

- (b) Clockwise
- (d) Can't be predicted
- 23. The mechanical energy spent by the external agency on a metallic rod connected with galvanometer and moving perpendicular to a magnetic field is converted into electrical energy, To increase electrical energy, mechanical energy has to be increased. This relates to:
  - (a) Ohm's law

(b) Coulomb's law

(c) Lenz's law

- (d) Newton's law of motion
- 24. A device which converts mechanical energy into electrical energy is called:
  - (a) Current generator (c) Transformer

- (b) The same and to the right
- (d) Inverter
- 25. By which of the following way an emf can be induced in a circuit that represent in an external magnetic field?
  - (a) By changing the area of circuit coil
- (b) By changing the magnetic field strength
- (c) By motion of the circuit coil
- (d) All of these
- 26. A conducting rod of length 0.5 m moves parallel to a magnetic field of magnitude 2 T with velocity 5 ms-1, the emf induced in the moving rod is:

  - (a) 5 V (b) 10 V
    - (c) 20 V (d) 0 V

(c) Magnet

(d) Load

- 27. In A.C generator are responsible to provide induced current from armature to external circuit: (b) Split rings
- (a) Carbon brushes
- 28. The Len'z law refers to:
  - (a) Induced current
  - (c) Motional emf

- Induced potential
- (d) All of these
- 29. Magnetic induction is also called
  - (a) Flux

- (b) Magnetization (d) Flux intensity
- (c) Magnetic intensity 30. The role of inductance is equivalent to
- (c) Energy
- (d) Momentum

- (a) Inertia (b) Force
- 31. In step down transformer
- is decreased in secondary coils.

- (a) Electric field (b) Number of turns

- (c) Magnetic field
- (d) None of these

- 32. Motional emf induced in a coil is independent of
  - (a) Number of turns

(b) Change in flux

(c) Change in time

- (d) Resistance
- 33. For a metal rod of length L and moving with speed v in perpendicular to magnetic field then motional emf at its end is
  - (a) vBL
- (b)  $vLB^2$
- (c)  $v^2BL$
- (d) None of these

| 400000000000000000000000000000000000000 | STATISTICS. | DAY DOWN | Total Section Section |     | -   |     |     | -   |    |     |    |     |      |
|-----------------------------------------|-------------|----------|-----------------------|-----|-----|-----|-----|-----|----|-----|----|-----|------|
| Sr.                                     | 21.         | 22.      | 23.                   | 24. | 25. | 26. | 27. | 28  | 29 | 30  | 31 | 32. | 33.  |
| Ans:                                    | c           | C        | C                     | 2   | d   |     | -   | 20. |    | 30. | -  |     | a    |
|                                         |             |          |                       | a   | a   | a   | D   | a   | d  | a   | b  | a   | - 11 |

MDCAT PREP BOOK

370

By AZHAR IQBAL 0336-7098894

**ELECTROMAGNETIC INDUCTION** 

- 34. One of the major reasons for power loss in transformer is
  - (a) Radiation loss

UNIT 09

(b) Convection loss

(c) Eddy current loss

- (d) All of these
- 35. Whenever the magnetic flux linked with an electric circuit changes, an emf is induced in the circuit. This is called
  - (a) Electromagnetic induction
- (b) Kirchoff's law

(c) Hysteresis loss

- (d) Lenz's law
- 36. Time varying magnetic field creates electric field, this is called
  - (a) Electric induction

- (b) Magnetic induction (d) Dipole induction
- (c) Electromagnetic induction 37. The direction of induced current is always so as to oppose the change which causes the current is

- (a) Faraday's law 38. Transformer operates on:
  - (b) Lenz's law
- (c) Ohm's law
  - (d) Kirchoff's law
- (a) A.C (b) D.C 39. Current carrying loop behave like a magnetic:
  - (a) Monopole
    - (b) Dipole

(c) Both

- (d) None of these (d) Octopole
- (c) Quadrupole 40. Faraday law states that the rate of change of magnetic flux is equal to:
  - (a) Electromotive force

(b) Induced current

(c) Induced flux

- (d) Induced magnetic field
- 41. Power transformers are designed to have maximum efficiency at:
  - (a) Full load (b) 50 % (c) 80%
- 42. Which of the following is expression of induced current in A.C generator?

- (a)  $I = \frac{\varepsilon_o}{R} \sin(\omega t)$  (b)  $I = \frac{\varepsilon_o}{R} \cos(\omega t)$  (c)  $I = \frac{\varepsilon_o}{R} \tan(\omega t)$  (d)  $I = \frac{\varepsilon_o}{R} \sec(\omega t)$ 43. "The direction of the induced current is always so as to oppose the change which causes" is a
  - (a) Faraday's law (b) Lenz's law
- (c) Ampere's law 44. A straight conductor of length 4 m moves at a speed of 5 m s⁻¹ when the conductor moves at an
- angle of 60° with the direction of magnetic field of induction 0.5 T, the emf induced is: (b) 8.66 V 45. In A.C generator, if coil rotates with frequency of 50 Hz, how many times the current will reverse
  - (a) 100
    - (b) 50
- 46. The working principle of an A.C. Generator is:

(a) NωAbcos(ωt)

- (a) Self induction
- (c) Mutual induction 47. Emf produced in generator is:

(b) Ohm's law

(c) 6.75 V

- (d) Faraday's law
- (c) NωABcot(ωt) (d) NωABsin(ωt)

(c) 200 (d) 25

- (b) NωAbtan(ωt) 48. Lenz's law provides information about direction of:
  - (a) Inductance (c) Induced flux

(b) Induced current

- 49. SI unit of inductance is
  - (a) Henry (b) Farad

- (c) Not generates
- 50. When north pole of bar magnet move towards a conducting loop, induced current flows in
  - (b) Anticlockwise direction (d) Not enough information

(d) Induced magnetic field

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# PRACTICE TEST NO. 2

| . SI unit of magnetic in | ıdu | uction | 1 15 |
|--------------------------|-----|--------|------|
|--------------------------|-----|--------|------|

(a) Weber 2. The insulation between sheets of transformer core is to get small:

(b) Gauss

(c) Tesla

(d) Maxwell

(b) Eddy current (a) Hysteresis loop

(c) Both

(d) None of these

3. Power transformer have maximum efficiency at

(a) No load

(b) Full load

(c) Half load

(d) Double load

4. Calculate the maximum motional emf when the velocity is 10m/s, the length is 3m and the magnetic field density is 5T

(a) 150V

(c) 100V

(d) 0V

5. A real transformer does not change:

(a) Voltage level

Power level Frequency level

(c) Current level 6. Principle of transformer is

(a) Mutual induction

Self induction

(c) Motional emf

(d) All of these

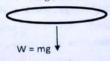
7. Motional emf induced in a coil is dependent on

(a) Magnetic field

(c) Length (b) Orientation

(d) All of these

8. A ring is allowed to fall above a magnet as shown in the following figure:



(a) Clock-wise, south

(b) Clock-wise, north

(d) Anticlockwise, south

(c) Anti-clockwise, north 9. In the diagram shown a bar magnet is moved along the common axis of two single turn coils A and B in the direction of arrow. Then:



Current is induced only in A and not in B

(b) Induced currents in A & B are in the same direction

Current is induced only in B and not in A

(d) Induced current in A and B are in opposite directions

10. The magnitude of induced emf is proportional to:

(a) Increase in flux

(b) Decrease in flux (d) Change in flux

(c) Rate of change of flux 11. Faraday's law explains how electric field will interact with

(a) Electric field

(b) Magnetic field (c) Battery

(d) None of these

| (-)               |                    |    |    |    |    | -  | 1000 | And the second |    | 10. | 11. |
|-------------------|--------------------|----|----|----|----|----|------|----------------|----|-----|-----|
| Sr.               |                    | 2. | 3. | 4. | 5. | 6. | 7.   | 8.             | 9. | 10. | -   |
| TANK LINE AND AND | THE PARTY NAMED IN | b. | b  | 2  | d  | а  | d    | c              | d  | C   | 0   |
| Ans:              | C                  | D  | U  | a  | u  | -  |      |                |    |     |     |

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| 12. | The me  | otional emf is given                   | by            | FIRST OF STREET   | J.F    |              | ALL YOR O'CH  | SERENCE STATE | AL 17 200  |
|-----|---------|----------------------------------------|---------------|-------------------|--------|--------------|---------------|---------------|------------|
|     | (a)     | qvB                                    | (b) iBL       |                   | (c)    | eBL          | (-            | ) vBL         |            |
| 13. | When    | the coil and a bar<br>d e.m.f will be: | magnet a      | re placed ver     | v cla  | se to each   | other the     | the value     |            |
|     | induce  |                                        | 1.00          |                   | , сто  | se to cach   | other, the    | the value     | of their   |
|     | (a)     | Maximum                                | (b) Pos       | itive             | (c)    | Negative     | 14            | ) Zero        |            |
| 14. | A bar   | magnet is hung b                       | v a string    | with March        |        |              |               |               |            |
|     | horizo  | ntal circular coil.<br>I from above).  | Which of      | the following     | state  | ment abou    | t the indu    | oscillating   | above a    |
|     |         | from above).                           |               |                   |        | ment abou    | the man       | du current    | i is true  |
|     | (a)     | Induced current flo                    | ws clock w    | ise               |        |              | S             | 711.74115.75  |            |
|     | (b)     | Induced current flo                    | ws anticloc   | kwise             |        |              | N             | HE, P. S      |            |
|     | (c)     | Induced current rev                    | erses it dire | ection repeated!  | y      |              |               | The County    |            |
|     | (d)     | None of these                          |               |                   |        |              |               |               |            |
|     |         |                                        |               |                   |        |              |               | >             |            |
| 15. | The m   | agnetic flux linked                    | with a coil   | is changed for    | 1      | W            |               |               |            |
|     |         |                                        |               | is changed if     | om 1   | W D to 0.1   | Wb in 0.01    | s. The indu   | ced emf    |
|     | (a)     |                                        |               |                   | (b)    | 0.009 V      |               |               |            |
|     | (c)     | 10 V                                   |               |                   | Ch     | 00.11        |               |               |            |
| 16. | An alt  | ernating voltage p                     | roduced b     | y ac generato     | r is g | iven by 2    | Osin(157t)    | The form      |            |
|     |         | 0 0                                    |               |                   |        |              | (1371)        | . The frequ   | ency of    |
|     |         | 50 Hz.                                 | (b) 100       | Hz                | (c)    | 25 Hz        | (d)           | 75 Hz         |            |
| 17. | A coil  | of 20cm × 20cm I                       | naving 30     | turns is makir    | ng 30  | rps in a m   | agnetic fiel  | d of 1 T T    | he neek    |
|     |         | The managed cann                       | approxii      | nately:           |        |              | 1 10 10 10 10 |               | не реак    |
|     | (a)     | 452 V                                  | (b) 113       | V                 | (c)    | 226 V        | (d            | ) 339 V       |            |
| lð. | I Wo di | fferent wire loops                     | are concen    | tric and lie in   | the sa | me plane.    | The curren    | t in the out  | er loop is |
|     | (a)     | ise and increasing<br>Clock wise       | with time.    | The induced of    | urrer  | it in the in | ner loop the  | n is:         | - A SE     |
|     | (b)     | Counter clock wis                      |               |                   |        |              |               |               |            |
|     | (c)     | Zero Zero                              | se            |                   |        |              |               |               |            |
|     | (d)     |                                        | 4             | to all the party  | 1 1    |              |               |               |            |
| 19. |         | In a direction that                    | depends of    | n the ratio of th | e loop | radii        |               |               |            |
|     | inducti | of the following                       | is not s      | statement of      | Fara   | day's pro    | posed law     | s of electr   | romagneti  |
|     | (a)     |                                        | in field :- 1 |                   |        |              | 14 1          |               | 16.5       |
|     |         | Changing magnet                        | ic field ind  | uces an electro   | magn   | etic force i | n conductor   |               |            |

Electromagnetic force is proportional to rate of change of field

(c) Induced current opposes the cause which induces it

Both A and B

UNIT 09

20. In A.C generator if vector area of coil is parallel to magnetic field, the emf induced is:

(a) Half of maximum

(b) Zero

(c) Maximum 21. Slip rings in A.C generator are connected with:

(d) One fourth of maximum

(a) Ends of armature coil (c) External load resistance

(b) Field magnet (d) Commutator

22. A device which converts mechanical energy into electrical energy called: (a) Current generator

(b) Electric motor

(c) Thermistor

(d) Transformer

23. In a primary coil 5 A current is flowing on 220 volts. In the secondary coil 2200 V voltage produces. Then ratio of number of turns in secondary coil and primary coil will be:

(b) 10:1

(c) 1:1

(d) 11:1

| Sr.      | 10  | THE PASSAGE | -   |     |     |     |     |     |     |     |     |     |
|----------|-----|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Sr. Ans: | 12. | 13.         | 14. | 15. | 16. | 17. | 18. | 19. | 20. | 21. | 22. | 23. |
| 11113;   | d   | d           | c   | d   | c   | c   | b   | d   | c   | а   | a   | Ь   |
|          |     |             |     |     |     |     |     | -   |     |     |     |     |

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| Ans:                    | b        | b                        | c           | a           | c             | C                                 | d        | a              | b       | b                             | C            | a      | 0               | - 4             |        |
|-------------------------|----------|--------------------------|-------------|-------------|---------------|-----------------------------------|----------|----------------|---------|-------------------------------|--------------|--------|-----------------|-----------------|--------|
|                         | 3000     | STATE OF THE PARTY.      | Markey Long | MODEL AND A | ALCOHOL:      | -                                 | C. State |                |         |                               |              | d      | b               | d               | b      |
| Sr.                     | 24.      | 25.                      | 26.         | 27.         | 28.           | 29.                               | 30.      | 31.            | 32.     | 33.                           | 34.          | 35.    | 36.             | 37.             | 38.    |
| Title                   |          |                          |             |             |               |                                   |          |                |         | 19)                           |              |        |                 |                 | 120    |
| (a                      | ) An     | npere's                  | s Law       | (b          | ) Fa          | raday                             | s Law    | (c)            | Lei     | IZ S La                       | The state of | 1      |                 | A PILO          |        |
| 38. emf =               | N(Δ      | $\emptyset/\Delta t$ ) i | s acco      | rding       | to:           |                                   |          | 15.            | Lau     | ız's La                       | 11/20        | (d     | No.             | ne of t         | hese   |
|                         | ) 50     |                          |             | (b          | ) 60          | 1%                                |          | (c)            | 909     | %                             |              | (d     | ) 80            | 70              |        |
| main                    | cable    | is 0.5                   | A. Cal      | culate      | the e         | fficien                           | cy of t  | he tran        | 310111  |                               |              |        |                 |                 |        |
| 37. A tra               | nsfor    | mer is                   | used        | to ligh     | it 100        | W 25                              | volt     | lamp fr        | rom 2   | 50 Vo                         | lt ac r      | nains. | The             | curren          | t in t |
| 1.                      | ) 40     |                          |             |             |               |                                   |          | (-)            | 40      |                               |              | PC 16  |                 |                 |        |
| 36. If the              | flux a   | ISSOCIA                  | ited w      | in a c      | ) 4(          | 100 tu                            | , ns va  | (c)            | 1       | 7 (4)                         | ill m        | (d     | ) Ze            | ro              |        |
| 36. If the              | ) No     | OAB .                    |             | (b          | ) N           | 100 to                            | rne va   | ries at        | the ra  | te of 2                       | 40 WI        | o/min. | the er          | mf ind          | uced i |
| 35. The r               |          |                          | duced       | emfi        | n A.C         | , gener                           | rator I  | s given<br>(c) | Dy:     | NfAB                          |              | (d     | ) Bo            | th a an         | id c   |
|                         | Vo       |                          |             |             |               |                                   |          | a airon        | her     | 1000                          | 1012.0       |        | au              | 010             |        |
|                         |          |                          |             |             |               | urrent                            |          | (c)            |         | equenc                        | y            | (d     |                 | ove             | ile    |
| 34. Quan                | tity th  | at ren                   | nains       | uncha       | nged          | in a tr                           | ansfor   | mer is:        |         |                               |              |        | N               | one of t        | the    |
|                         |          |                          |             |             |               |                                   |          |                | the     | length                        |              |        |                 |                 |        |
| (a)                     | Me       | uar to                   | n due t     | o grav      | itv           |                                   |          | (d)            | ) De    | pends                         | on the       | diame  | ter of          | the rin         | g and  |
| along                   | the a    | ual to                   | that du     | e to a      | ravity        |                                   |          | (b)            | 1 6     | SS IIIAII                     | due u        | JEIGVI | Ly              |                 |        |
| 3. A cop                | per ri   | ng is i                  | the rin     | a Th        | e acce        | eleratio                          | on of t  | ne taiiii      | ng ma   | gneth                         | mile it      | S IIIO | ton io.         |                 |        |
|                         | 1 V      |                          | ald t       | . wizon     | tally         | and a                             | har m    | agnet is       | drop    | ped th                        | rough        | the r  | ing wi          | th its l        | ength  |
|                         |          |                          |             | 71.         | 1 5           | 17                                |          | 10             | 711     | V                             |              | (0     | ) Ze            | ero             |        |
| 2. A coil               | of are   | a 100                    | cm* h       | as 500      | turn          | s. Mag                            | ced or   | neia of        | e coil  | is:                           | Perp         |        | (139)           | 1 10            |        |
| (a)<br>2. A coil        | 5 X      | 10-3 V                   | Wb,         | (b          | ) 5           | × 10                              | Wb       | Gold of        | 0 1 W   | /hm ⁻² i           | s nerr       | endic  | ular t          | o the c         | oil. T |
| magne                   | etic flu | ıx link                  | ced wi      |             |               |                                   |          | (c)            |         |                               |              |        |                 |                 |        |
| norma                   | al to th | ne pla                   | ne of t     | he coi      | l mai         | kes an                            | angle    | of 60° v       | vith th | ne dire                       | ction        | of the | magn            | etic ne         | ia. I  |
| 4 4                     |          |                          | e and       | area 5      | squa          | are cen                           | timet    | er is pla      | ced in  | n a ma                        | gnetic       | field  | $\mathbf{B}=0.$ | 2 T. T          | he     |
| 1-1                     | A        | mara I                   | 222/        | (h          | ( C           | oulom                             | h law    | (C             | 1 Le    | mz s la                       | W            | (      | 1) 16           | maday           | 3 law  |
| 0. A mo                 | ing c    | onduc                    | tor co      | il in a     | mag           | netic fi                          | eld pr   | oduces         | an in   | duced                         | emf.         | his is | in acc          | cordan          | ice wi |
| (a)                     | 1-re     | volutio                  | on          | (b          | $\frac{1}{2}$ | evoluti                           | ion      | (c)            | ) 11    | revolut                       | ion          | (0     | 1) 2            | revolut         | tion   |
| each:                   |          |                          |             |             |               |                                   |          |                |         |                               |              |        |                 |                 |        |
| 29. When                | a wir    | e loop                   | is rot      | ated i      | n a m         | agneti                            | c field  | , the di       | rectio  | n of in                       | duced        | emf    | change          | es once         | in     |
| (-)                     | 0.5      | sunda.                   |             | (1-         | 0             | Lyolt                             |          | (c)            | 11      | volt                          | 2 like       |        |                 | volt            | - 75   |
| Wbm                     | 1. The   | emfi                     | induce      | d in it     | will          | be:                               |          |                |         |                               |              |        |                 |                 |        |
| 28. A two               | mete     | r wire                   | is mo       | ving v      | vith a        | veloci                            | ty of 1  | ms-1 pe        | rpen    | dicular                       | to a r       | magne  | tic fie         | ld of 0         | .5     |
|                         | A        |                          | Land        |             |               |                                   |          | (ď             | ) Le    | nz's la                       | W            |        |                 |                 |        |
| (a)                     | Mı       | itual ir                 | ductio      | n           |               |                                   |          | (b)            | ) Se    | If indu                       | ction        |        |                 |                 |        |
| 27. A tra               | neform   | namo<br>ner is           | based       | on the      | prin          | ciple o                           | f:       |                |         |                               |              |        |                 |                 |        |
|                         | Dy       |                          | ciccii      | (b          | ) G           | enerato                           | r        | (c)            | Ele     | ectric r                      | notor        | (0     | f) In           | duction         | n coil |
| 26. A dev               | ian an   | Δt                       | electr      | ical e      | nergy         | into n                            | nechai   | nical en       | ergy    | is:                           |              |        |                 |                 |        |
| (a)                     | 0 :      | = 40 +                   | $\Delta t$  | (b          | ) Q           | $=\frac{\Delta \theta}{\Delta t}$ | × R×     | t (c)          | Q:      | $=-\frac{\Delta V}{\Delta t}$ | $+R\times$   | t (c   | 1) Q            | $=\frac{dV}{R}$ | < t    |
| by:                     |          |                          |             |             |               |                                   |          |                |         | 40                            |              |        |                 | Ad              |        |
| the to                  | tal ele  | ctric c                  | harge       | Q, wl       | nich p        | assing                            | durin    | g this t       | ime t   | hroug                         | h any        | point  | of circ         | cuit is         | given  |
|                         | lagne    | ne muz                   | C throu     | ign a       | circui        | t of re                           | sistan   | ce K ch        | anges   | by an                         | amou         |        |                 | 1. 1            | Heli   |
|                         |          | i. a                     | theat       | ah a        |               | 4 af ma                           | Latare   | o D ab         | anne    | he on                         | amor         | int Ad | in ti           | me At.          | Thon   |
| (a)<br>(c)<br>25. The n | Vil      | oration                  | s of the    | a prim      | ary co        | oil of mo                         | latana   | (d)            | lro     | n core                        | of trai      | nsform | er<br>in ti     | me At           | Then   |

| UNIT 09            | -           |          |             |            |          |         | TIC II    |         |         | 100     | -       | Zaya       |
|--------------------|-------------|----------|-------------|------------|----------|---------|-----------|---------|---------|---------|---------|------------|
| 39. The trai       | sforme      | r lami   | nation      | is are i   | insulat  | ed fro  |           |         |         |         |         | E STA      |
| (a)                | Mica str    |          |             |            |          |         | - 1       | ) Pa    |         |         |         | Salva S    |
| (c)                | Thin coa    | ating o  | t Varr      | iish ,     |          |         | ((        |         | y of th | ne abov | ve      |            |
| 40. For curi       |             |          |             |            |          |         | field     |         |         |         |         |            |
| (a)                | Electros    |          |             | b) M       | lagneto  | static  | . (0      | ) Ele   | ctrom   | agnetic | (d)     | None o     |
| 41. Primary        | and sec     | condar   | y pow       | ers of     | a tran   | sform   | er are    | 200W    | and 1   | 00W r   | respect | ively, the |
| of a tran          | stormer     | ' IS     |             |            |          |         |           |         |         |         |         | AND P      |
|                    | 50%         |          |             | b) 1       |          |         | (c)       | 20%     | 6       | 1       | (d)     | 10%        |
| 42. For an e       | ficient s   | step-de  | own tr      | ansfor     | mer.     |         | House     |         |         | Serie.  | Sept. O |            |
| (a) V              | oltage in   | n prima  | ary and     | secon      | dary ar  | e equa  | 1         |         |         |         |         |            |
| (b) C              | urrent in   | prima    | ry and      | second     | dary an  | e equa  | 1.        |         |         |         |         |            |
| (c) - Ir           | put pow     | er is sa | ime as      | the ou     | tput po  | wer     |           |         |         |         |         | 7          |
| (d) O              | utput por   | wer is:  | zero        |            |          |         |           |         |         |         |         |            |
| 3. Energy st       | ored in     | an ind   | uctor       | is         |          |         |           |         |         |         |         |            |
| (a) I              | lectric e   | energy   |             |            |          |         | (b)       | Magr    | etic e  | nergy   |         |            |
| (c) I              | lectroma    | agnetic  | energ       | y          |          |         | (d)       | Roth    | a and   |         |         |            |
| 4. According       | to Fara     | aday's   | Law,        | emf in     | duced    | in cire | uit der   | ends o  | n:      | 1       |         |            |
| (a) N              | lax: mag    | gnetic 1 | lux         |            |          |         | (b)       | Rate    | of char | nge of  | magnet  | ic flux    |
| · (c) (            | hange in    | nagn     | etic fl     | ux .       |          |         | (d)       | Initial | flux    |         |         |            |
| 5. A 100 tur       | n coil of   | f area   | 0.1 m       | 2 rota     | tes at l | half a  | revolu    | tion no |         | nd. It  | is plac | ed in a    |
| magnetic           | iela or (   | 0.01 1   | perpe       | endicu     | ar to t  | he axi  | s of ro   | tation  | of the  | coil.   | alcula  | te the ma  |
| voltage ge         | ierated     | in the   | coil?       |            |          |         |           |         |         |         |         | te the mi  |
|                    | 6.33 V      |          |             | 11.7       |          |         | (b)       | 89.12   | V       |         | -       |            |
|                    | 314 V       |          |             |            | THE      | 123     | (d)       | 3 1454  |         |         |         |            |
| 6. In step up      | transfor    | rmer_    |             | is incre   | eased i  | n seco  | ndary     | coils . |         | 4,      |         |            |
| (a) El             | ectric fie  | eld      |             |            |          |         | (b)       | Magne   | tic fie | ld -    | aria.   |            |
| (c) N              | imber of    | f turns  | ALTIC STATE |            |          |         | (d)       | None o  | of thes | e ·     | 1       | -          |
| . Power trai       | sfer fro    | m pri    | mary        | to seco    | ndary    | is thre | ugh fl    | ux link | age, se | the p   | rimar   | v and sec  |
| coils should       | be wou      | und in   | such a      | a way i    | that flu | ix cou  | pling b   | etween  | them    | is      |         |            |
| (a) M              | n           |          | (b)         | Zero       |          |         | (c)       | Consta  |         |         | (d)     | Max        |
| . Which of the     | e follow    | ving is  | the u       | nit of n   | nutual   | induc   | tance?    |         |         |         | (-)     |            |
| (a) Vs             | A-2         |          | (b)         | V3sA       | 2        |         | (c)       | $V^2s$  |         |         | (d)     | VsA-I      |
| . Motional e       | nf can b    | e proc   | duced       | with       |          |         |           |         |         |         | (4)     |            |
| (a) Ch             | anging n    | nagnet   | ic field    | d in spa   | ice -    |         | (b)       | Changi  | ng ma   | onetic  | field i | n time     |
| (c) Ch             | inging f    | lux wit  | th spac     | e          |          |         |           | Consta  |         |         |         | H tillie   |
| If the suppl       | v freque    | ency of  | f a tra     | nsform     | er inc   | rease.  | the sec   | ondar   | outr    | ut vol  | tage o  | fthe       |
| transforme         | CONTRACT OF | 1909     |             |            |          | ,       | ····· sec | onuni,  | out     | ut voi  | tage o  | the        |
|                    |             |          | gan         | THE COLUMN |          |         |           | Remain  | 10      |         |         |            |
| (a) Inc            | ease        |          | (b)         | Decre      | ase      |         | (C)       | unchan  |         |         | (d)     | Any of al  |
|                    |             | 1        | 1           | - Interest |          |         |           |         | 5       |         |         | 300        |
| THE PARTY NAMED IN | 70          | 40.      | 41.         | 42.        | 43.      | 44.     | 45.       | 46.     | 47.     | 48.     | 49.     | 50.        |
| Sr.<br>Ans:        | 39.         | c        | a           | c          | b        | b       | 1019      | -       | 10.00   | 100     | -       | 50,        |

# PRACTICE TEST NO. 3

1. It is desired to make an A.C generator that can produce an emf of maximum value 5 kV with 50 Hz frequency. A coil of area 1 m2 having 200 turns is used as armature. What is the magnitude of magnetic field in which the coil rotates?

(a) 0.04 T

(c) 0.08 T

(d) 0.50 T

2. In Faraday's law  $\varepsilon = -N \frac{\Delta \theta}{\Delta t}$ , then negative sign indicates that:

(a) Direction of induced emf is such that it opposes the change in flux

(b) Direction of induced emf is such that it favors the change in flux

(c) Emf induced is decreasing

(d) All of these

3. If frequency of rotation of A.C generator is 60 Hz, how many times alternating current will reach to maximum value in one second?

(a) 60

(c) 240

4. When a magnet was pushed towards a solenoid, the meter connected to the solenoid showed a deflection to the right, when the same magnet was pulled away from the solenoid at the same speed, what was the deflection on the meter?

(a) Greater and to the right

(b) The same and to the right

(d) Zero

(c) The same but to the left 5. The rod of unit length is moving at 30° through a magnetic field of 1 T. If velocity of rod is 1 m/s, then induced emf in the rod will be given by:

(b) 0.5 V

(c) 0.25 V

6. A magnetic field of induction 10 T acts at right angle to a coil of area 100 cm2 with 200 turns and having a resistance of  $10\Omega$ . The coil is removed at a uniform rate from the field in 0.5 sec. the induced current is

(a) 0.4 A

7. A copper ring is suspended by a thread in a vertical plan. The north pole of a magnet is brought near the ring in horizontal direction as shown. What will be of effect on the ring?

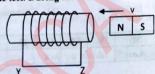
(a) Ring will be attracted towards the magnet

Ring will be repelled away

(c) Ring will make simple harmonic motion

(d) No change in the position of ring

8. In the following diagram, X is a coil with a hallow core. The magnet is pushed at constant speed of from the right end into core and out again at the left. During the motion:



(a) Current in wire YZ will be from Y to Z

Current in wire YZ will be from Z to Y

Current in wire YZ will be from Z to Y and then from Y to Z

(d) Current in wire YZ will be from Y to Z and then from Z to Y

|      |     |    |    |    |    |    | The same of the sa |
|------|-----|----|----|----|----|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sr.  | 1,  | 2. | 3. | 4. | 5. | 6. | 7. 8.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Ans: | · c | a  | b  | c  | b  | b  | b d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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| LECTROMAGNETIC I | NDUCTIO           |
|------------------|-------------------|
|                  | ELECTROMAGNETIC I |

9. A straight wire of length 0.20 m moves at a steady speed of 3.0 m s⁻¹ at right angle to the magnetic field of flux density 0.10 T, the emf induced across the ends of wire as:

(b) 0.06 V

(c) 0.05 V

10. A coil having number of turns N and cross-sectional area A is rotated in a uniform magnetic field R with an angular velocity ω. The maximum value of the emf induced in it is:

(b) NBAω

11 The induced current in A.C generator of frequency 50 Hz reaches to zero value per second.

12. The general expressions of induced emf by A.C generator is given as:

(a)  $\varepsilon = N\omega AB \sin \theta$ (c)  $\varepsilon = N\omega AB\cos\theta$ 

(b)  $\varepsilon = N\omega AB \tan \theta$ 

(d)  $\varepsilon = N\omega AB \sec \theta$ 

13. In A.C generator, which of the following is not used?

(a) Armature

(b) Field magnet

(c) Stator

14. While discussing motional emf in a conductor moving in uniform magnetic field, the electric and magnetic force on charge particle in that conductor are at: (a) 0°

(b) 180°

15. Mathematical form of Faraday's law is:

(a)  $\varepsilon = -N \frac{\Delta B}{\Delta t}$ 

(b)  $\varepsilon = -N \frac{\Delta \phi}{\Delta \epsilon}$ 

16. In a transformer the primary has 500 turns and secondary has 50 turns. 100 volts are applied to the primary coil, the voltage developed in the secondary will be:

(a) IV

(b) 10 V

(d) 10000 V

17. A transformer is employed to reduce 220 V to 11 V. The primary draws a current of 5 A and the secondary 90 A. The efficiency of the transformer is:

(a) 20%

(b) 40%

(d) 90%

18. The transformer ratio in the step-up transformer is:

(b) Greater than 1

(c) Less than 1

Depends upon output power

19. If rotational velocity of a dynamo armature is doubled, then induced emf will become:

(a) Half

(b) Two times

(c) Four times

(d) Unchanged

20. Which of the following is constructed on the principle of electromagnetic induction?

(a) Galvanometer

(b) Electric motor

(c) Generator (d) Voltmeter

21. A conducting rod of length ℓ is falling with a velocity v perpendicular to a uniform horizontal magnetic field B. The potential difference between the two ends will be:

(a) 2Bev

(b) Bℓv

(c) -Bev

(d) B2 2 v

22. A 10 meter wire falling with velocity 5 ms⁻¹ if length is perpendicular to the field  $0.3 \times 10^4$  Wbm 2. The induced emf across the terminal will be:

(a) 0.15 V

(a) Wbm⁻²

(b) 1.5 V

(c) 1.5 mV

(d) 15.0 V

23. If a coil of metal wire is kept stationary in a non-uniform magnetic field then:

(a) An emf is induced in the coil (c) Neither emf nor current is induced 24. The unit of magnetic flux is:

(b) A current is induced in the coil (d) Both emf and current is induced

(b) Wb (c) Henry 25. A coil having 500 square loops each of side 10cm is placed normal to a magnetic flux which increase at the rate of 1 Ts 1. The induced

| (a) 0.1 | 2 0 | 9   |     | (b) | 1   |     | ı em |     |     | 0 . | 5  |     |    | 10 | 5   |    |    |
|---------|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|----|-----|----|----|-----|----|----|
| Sr.     | 9,  | 10. | 11. | 12. | 13. | 14. | 15.  | 16. | 17. | 18  | 19 | 20  | 21 | 22 | 23  | 24 | 24 |
| Ans:    | b   | b   | ·a  | a   | c   | ь   | b    | b   | d   | b.  | b  | C . | b  | C. | C . | b  | d  |

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42. The resistance of winding of transformer can be decreased by increasing:

| UNIT 09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ELECTROMAGNE                            | C 11-h       | ab abange fro                    | m R to                                     | in a time        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------|----------------------------------|--------------------------------------------|------------------|
| 26. A coil having an area A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | is placed in a magnet                   | ic field wh  | ich changes fro                  | III Do 10                                  | and time         |
| interval t. the emf indu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ced in the con win be.                  |              |                                  |                                            |                  |
| 3A ₀ B ₀                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (b) $\frac{4A_oB_o}{t}$                 | (c)          | $\frac{3B_o}{A_o t}$             | (d),                                       | At               |
| (a) $\frac{-t}{t}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (0)                                     |              | Aot                              |                                            | A ₀ t |
| 27. Lenz's law is consequen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | nce of the law of conser                | vation of:   |                                  | (4)                                        | energy           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         |              | Mass                             |                                            |                  |
| e In a sten un transform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | er the ratio of voltage                 | s is 20. If  | the voltage ac                   | ross prin                                  | hary is 110 V,   |
| voltage across the secon                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | idary will be:                          |              |                                  |                                            |                  |
| 1 000 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (b) 7400 V                              | (c)          | 1800 V                           |                                            | 2200 V           |
| o The ratio of the number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | r of turns in primary t                 | to seconda   | ry coil of a trai                | nsformer                                   | is /:19. The ra  |
| of the power in the prin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | nary and secondary co                   | ils will be: |                                  |                                            |                  |
| 107                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | · (b) 1.10                              | (c)          | 7:19                             | (d)                                        | 1:1              |
| a mi -the of the second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ary to the primary turi                 | ns in a trai | sformer is 5:6                   | and the                                    | output power is  |
| Neglecting all power lo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | sses, what is the ratio o               | f input to   | output current                   |                                            |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (6) 5:6                                 | (C)          | 9:0                              | (u)                                        | 6:5              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | on the turns ratio is 1                 | 1:10. A res  | istance of 200                   | ohm cor                                    | nected across    |
| 1. In a step-up transform<br>secondary is drawing a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | current of 0.5 A. What                  | t is the pri | mary voltage a                   | nd curre                                   | nt?              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b) 10 V, 5 A                           | (c)          | 25 V, 4 A                        | (d)                                        | 20 V , 2 A       |
| (a) 50 V, 1 A<br>2. Efficiency of a transfor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |              | THE PARTY OF                     |                                            |                  |
| 2. Efficiency of a transfor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                         | (b)          | Insulations bet                  | ween plat                                  | es               |
| (a) Core of transfor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                         | (d)          | All of these                     | er offer                                   |                  |
| (c) Resistance of co                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OIIS                                    | (0)          | and the state of                 | or and                                     | a managed and    |
| 3. Condition for a step-do                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | wn transformer:                         | (0)          | $N_s = N_p$                      | (d)                                        | $N_a > N_c$      |
| (a) $N_s < N_p$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b) $N_s > N_p$                         | (C).         | ns neimory cut                   | rent is 5                                  | A. the seconds   |
| (a) $N_s \le N_p$<br>4. The power input to a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | main transformer is 10                  | 00 W. II II  | he turns ratio                   | forimar                                    | v to secondary   |
| 4. The power input to a voltage is 10 V and assu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | iming no losses in Iran                 | siormer, u   | ie turns ratio o                 |                                            | J to become      |
| (a) 4:1 step-up                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b) 4:1 step-down                       | 1 (c)        | Z. I Step-up                     | (u)                                        | 2.1 step-down    |
| S. Which quantity is decr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | eased in step-up transf                 | ormer?       |                                  |                                            |                  |
| 1 11 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (b) Voltage                             | (C)          | Power                            | (d)                                        | 2 A and those    |
| (a) Current<br>6. In an ideal transforme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | r, the voltage and the                  | current in   | the primary an                   | re 200 V,                                  | Z A and thuse    |
| the secondary are 2000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | V, I A. The value of I                  | is:          | HER STREET, ST.                  |                                            |                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         |              | 20                               | (d)                                        | 2                |
| (a) 0.2<br>7. The energy used to ma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | gnetize and demagneti                   | ze the cor   | e of transforme                  | er causes                                  | power loss will  |
| is due to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                         |              |                                  |                                            | Aller 1          |
| (a) Hysteresis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                         | (b)          | Eddy current                     | Sin la de                                  | Salah in the     |
| ***************************************                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -Ct                                     | (d)          | All of these                     | AL A TOP OF                                | Par and one and  |
| or the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | number of turns of                      | primary      | coll and secon                   | dary co                                    | il are 20 and    |
| ob. In a transformer, the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | is applied on primar                    | v coil, the  | en the ratio of                  | curren                                     | t in secondary   |
| respectively. If 220 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | is applied on primar                    | , соп, п     | a station diver                  |                                            |                  |
| primary coil is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (1) 0.2                                 | (c)          | 4:3                              | (d)                                        | 3:8              |
| (a) 3:4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (b) 8:3                                 | . (0)        |                                  |                                            |                  |
| 39. An ideal step-up transf                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ormer is one which:                     | (6)          | Keeps power le                   | evel                                       |                  |
| (a) Decrease current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                         | (b)          | ASSESSMENT OF THE REAL PROPERTY. |                                            |                  |
| (c) Increases voltage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ge level                                | (d)          | All of these                     |                                            |                  |
| 40. The core of a transform                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ner is laminated to redu                |              |                                  | and a                                      |                  |
| (a) Copper loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         | (b)          | Eddy current lo                  |                                            |                  |
| (c) Magnetic loss                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | E. S. Charles                           | (d)          | Hysteresis loss                  |                                            | and in the       |
| 41. The efficiency of a tra                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | nsformer which take in                  | put powr     | of 20 W is 70                    | %, the p                                   | ower supplied    |
| this transformer on out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | tout side is:                           |              |                                  |                                            |                  |
| (a) 12 W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (b) 20 W                                | (c)          | 14 W                             | · (d)                                      | 28 W             |
| Control of the last of the las | NAME OF TAXABLE PARTY OF TAXABLE PARTY. | 1-/          | 35. 36. 37.                      | THE RESERVE AND DESCRIPTION OF THE PERSON. | 9. 40. 41.       |
| Sr. 26. 27.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 28. 29. 30. 31. 32.                     | 33. 34.      | 33. 30. 37.                      | 30. 3                                      |                  |

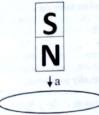
| (a)<br>(c)      |                                     | ited iron c            | ore         |                    |              | (b) Dian<br>(d) Leng                | th of wire |               |                                |
|-----------------|-------------------------------------|------------------------|-------------|--------------------|--------------|-------------------------------------|------------|---------------|--------------------------------|
| 43. For an      |                                     |                        | mer, the    | hysteresis         |              | its core he                         | ui oi wire | of the latest | are a second of                |
| (a)             | Infinite                            |                        | (b) S       | maller are         |              | c) - Zero                           |            | (4)           |                                |
| 44. What i      | is true for                         | a transfe              |             |                    |              |                                     | arca       | (a)           | Larger area                    |
| (a)             | Two coi                             | ils of Con             | per are w   | ound on d          | ifferent co  | roc .                               |            | The same of   | and the said                   |
| (b)             | Two coi                             | ils of silve           | r are wou   | ind on san         | ne core      | 163                                 |            |               |                                |
| (c)             | Two ele                             | ctrically o            | onnected    | coils are          | wound on     | came core                           |            |               |                                |
| (d)             | All of th                           | ese .                  |             | consult.           | would on     | same core                           |            | *             |                                |
| 5. Out of       | following                           | , what is              | true for a  | transfor           | mer?         |                                     |            |               | 1 2                            |
| (a)             | Coils are                           | electrica              | lly connec  | cted               |              | -                                   |            |               |                                |
| (b)             | Coils are                           | electrica              | lly insulat | ted                |              |                                     |            |               |                                |
| (c)             | Coils are                           | magnetic               | ally insul  | ated               |              | 4.                                  |            |               |                                |
| (d)             | Coils are                           | electrical             | ly insulat  | ed but ma          | gnetically   | connected                           |            |               | Andread to the second          |
| 6. For an i     | ideal tran                          | sformer,               | what is t   | rue?               |              | connected                           | 1000       |               |                                |
| (a)             | $\frac{V_s}{V_o} = \frac{I_P}{I_o}$ |                        | (b) Np      | $=\frac{V_P}{V_s}$ | (c)          | Ip N.                               |            | - (d) A       | ll of these                    |
|                 |                                     | 100                    | Ns          | $V_s$              | (0)          | $\frac{I_P}{T_s} = \frac{N_s}{N_f}$ |            |               |                                |
| /. A trans      | iormer na                           | as 100 Wi              | ndings ir   | primary            | and 200      | windings                            | in the se  | condary. 7    | The primary i                  |
| the follo       | cu to Aic                           | supply o               | 1 120 V a   | it 10 A. c         | heck the c   | correct sit                         | uation fo  | r this tran   | the primary i<br>sformer out o |
| the lone        | wing.                               |                        |             |                    |              |                                     |            | DC X N III    | de righted 1                   |
| (a)<br>(b)      | The secon                           | idary voit             | age is 240  | V and cu           | irrent is 20 | A                                   |            | priz alien    |                                |
| (c)             | The secon                           | dary volt              | age is 240  | V and cu           | irrent is 5  | A                                   |            |               |                                |
| (d)             | The secon                           | dary volt              | age is 60   | V and cur          | rent is 20   | A                                   |            |               |                                |
| . Transfor      | The secon                           | avample                | age is 60   | v and cur          | rent is 5 A  | a kurl                              |            |               | 10 10 11                       |
| (a)             | Statically                          | induced                | 01:         |                    | 4.1          |                                     |            |               | 11                             |
| (c)             | Dynamica                            | lly india              | d amf       |                    | (b)          | Motiona                             | 77.00      | 1000          |                                |
| . In an ide     | al transfe                          | armer co               | nneeted t   | 240 W              | (d)          | All of th                           | nese       |               |                                |
| turns 500       | The out                             | nut conn               | nuected t   | 0 240 V A          | A.C. havin   | ig primar                           | y of turn  | s 1000 and    | secondary o                    |
| The Court labor | 0. The out                          | put conn               | cereu to i  | 040 01 10          | v onm. Ih    | ie current                          | through    | loud:         | water with                     |
|                 |                                     | raneform               | (b) 12 A    | 4                  | (c)          | 0.6 A                               |            | (d) ze        | ro                             |
| current is      | s 5 A. Wh                           | ich of th              | er nas a    | turn ratio         | of 10:1 a    | ind is sup                          | plied at   | 100 V whe     | n the primar                   |
| (a) T           | The transfe                         | ich of the             | iollowin    | g stateme          | nt is false  | ?                                   |            |               |                                |
| (b) T           | Te seconda                          | ormer rati             | ng is 0.5 i | KV A               | 1.0 1.0      |                                     |            |               |                                |
| (c) T           | The second                          | lary contag            | e is 1000   | V                  | 4            |                                     |            |               |                                |
| (d) T           | The second                          | lary curre             | nt is 0.5 A | 1                  |              |                                     |            |               |                                |
| THE STATE OF    | ne second                           | ary powe               | r rating is | less than          | 500 W        |                                     |            |               |                                |
|                 |                                     |                        |             |                    |              |                                     |            |               |                                |
|                 |                                     |                        |             |                    | 750          |                                     |            |               |                                |
|                 |                                     |                        |             | about 4 di         |              | H & May                             |            |               | selay is i                     |
| anale sin       |                                     | State and State at the | -           | The second         |              | THE REAL PROPERTY.                  | 10000000   | a cold in     | and the second                 |
| Sr.             | 42.                                 | 43.                    | 44.         | 45.                | 46.          | 47.                                 | 48         | 40            | 50                             |
| Sr.<br>Ans:     | <b>42.</b> b                        | 43.                    | 44.         | 45.                | <b>46.</b>   | . 47                                | 48.        | 49.           | 50.                            |

UNIT 09

# PRACTICE TEST NO. 4

|    | the current                               | induced emf in a coil is independe | ent of | :\ |
|----|-------------------------------------------|------------------------------------|--------|----|
| 1. | In electromagnetic induction, the current | Resistance of                      | (d)    | 1  |

- (a) Change in flux (b) Time
- - circuit
- above
- 2. When the north pole of a magnet is brought near the coil, viewing above the induced current in the ring will be:



- (a) First clockwise then anticlockwise
- (b) In clockwise direction
- (c) In anticlockwise direction
- (d) First anticlockwise then clockwise
- 3. The direction of induced emf during electromagnetic induction is given by:
  - (a) Faraday's law
- (b) Lenz's law (c) Maxwell's law

- 4. According to Faraday's law of electromagnetic induction:
  - (a) The direction of induced current is such that it opposes the cause producing it
  - The magnitude of induced emf produced in a coil is directly proportional to the rate of change
  - of magnetic flux
  - (c) Induced current always decrease the Φ
  - (d) Induced current always increase Φ
- 5. The north pole of a magnet is brought near a magnet ring. Viewing from magnetic side the direction of the induced current in the ring will be:
  - (a) Clockwise
- (b) Anticlockwise
- (c) Towards north (d) Towards south
- 6. Magnetic flux in a circuit containing a coil of resistance  $2\Omega$  changes from 2 Wb to 10Wb in 0.2 sec. The charge passed through the coil in this time is:
- (b) 1.0 C
- (c) 5.0 C
- 7. A coil of area 80 cm2 and 50 turns is rotating with 2000 revolutions per minute about an axis perpendicular to a magnetic field of 0.05 Tesla. The maximum value of emf developed in it is:
  - (a) 200 π volt
- (b)  $\frac{10\pi}{3}$  volt
- (c)  $\frac{4\pi}{3}$  volt
- 8. A circular metal plate of radius R is rotating with a uniform angular velocity ω with its plane perpendicular to a uniform magnetic field B. Then the emf developed between the center and the rim of the plate is:
  - (a)  $\pi \omega BR^2$

- 9. Eddy current are produced when:

  - (a) A metal is kept in varying magnetic field (b) A metal is kept in the steady magnetic

  - (c) A circular coil is placed in a magnetic field (d) Through a circular coil, current is passed

| 100 | Sr.  | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|-----|------|----|----|----|----|----|----|----|----|----|
| 展   | Ans: | c  | С  | ь  | ь  | b  | d  | c  | a  | a  |

NMDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

| UNIT 09 | ELECTROMAGNETIC INDUCTION |
|---------|---------------------------|
|         |                           |

- 10. In transformer, core is made of soft iron to reduce?
  - (a) Hysteresis losses
- (b) Eddy current losses
  - (c) Force opposing electric current
- (d) None
- 11. The primary winding of a transformer has 100 turns and its secondary winding has 200 turns. The primary is connected to an AC supply of 120 volts and the current flowing in it is 10 A. The voltage and the current in the secondary are:
  - (a) 240 V, 5A
- (b) 240 V. 10A
- (c) 60V, 20 A (d) 120 V, 20A
- 12. A transformer connected to 220 volt lines shows an output of 2A at 11000 volt. The efficiency is 100%. The current drawn from the line is:
- (b) 200 A
- (c) 22 A (d) 11 A
- 13. A step up transformer has transformation ratio 5:3. What is voltage in secondary if voltage in primary is 60 V.
  - (a) 20 V
- (c) 100 V
- 14. "The direction of induced current is always so as to oppose the cause of that procures it", is a statement of:
  - (a) Lenz's law
- (b) Boyle's law
- (c) Faraday's law
- (d) Ohm's law

- 15. The coil of A.C generator is also known as:
  - (a) Commutator
    - (b) Field magnet
- (c) Stator
- (d) Armature
- 16. In armature coil of A.C generator, the emf induced in two sides is taken as zero because force experienced by charges in these sides is:
  - (a) Along the sides of the wires
- (b) Always zero
- (c) Perpendicular & not along sides of the wires (d) All of these
- 17. The current induced by A.C generator depends upon: (a) Area of armature coil
  - (b) Angular frequency of armature coil
  - (c) Number of turns of armature coil
    - (d) All of these
- 18. A cylindrical bar magnet is kept along the axis of a circular coil. If the magnet is rotated about its
  - (a) A current will be induced in the coil
  - No current will be induced in the coil
  - Only an emf will be induced in the coil
  - (d) Both a current and an emf will be induced in the coil
- 19. Lenz law is in accordance with:
  - (a) Law of conservation of momentum
  - (b) Law of conservation of angular momentum
  - (c) Law of conservation of K.E.
  - (d) Law of conservation of energy
- 20. A circular coil has area A and is placed in a uniform magnetic field such that its plane is perpendicular to the lines of force of the magnetic field. If the magnetic field has magnitude B and the plane of the coil is turned through 180° about an axis perpendicular to the magnetic field in a time t, what is the magnitude of the induced e.m.f?
  - (a) Zero

- 21. In electromagnetic induction, the induced emf is independent of: (a) Change in flux
  - (c) Time

- (b) Resistance of circuit
- (d) Number of turns 22. A generator produces a voltage that is given by  $V = 220 \sin 314 t$  volt, where time "t" is in second. The frequency of this voltage is:
  - (a) 55 Hz
- (b) 19 Hz
- (c) 60 Hz
- (d) 50 Hz

| Sr. 10           | 1000 | 11  | 12   | 1000 | 100,000 | 1000 | -   |     |     |    |     |            |     |
|------------------|------|-----|------|------|---------|------|-----|-----|-----|----|-----|------------|-----|
| Sr. 10<br>Ans: a | - 34 | *** | 12.  | 13.  | 14.     | 15.  | 16. | 17. | 18. | 19 | 20  | 21         | 22  |
| Aus: a           |      | a   | a    | c    | a       | d    | e   | d   | 4   | 7  | 20. | The second | LL. |
| NMDCATION        |      |     | 1000 |      |         |      |     | u   | u   |    | C   | b          | d   |

| UNIT 09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |            | ELECTROMAGNETIC INDUCTION |              |                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------|--------------|---------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| 1 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | of wire h  | as area A. It is          | placed pe    | rpendicular         | to a uniform     | m magnetic field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |
| 23. A rectangular loop of<br>and then spin around                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | one of i   | ts sides at frequ         | iency f. Th  | ie maximum          | maucea em        | 1 13.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
| DAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (b         | ) < 10BAt                 | (C)          | ZDAI                | ((1)             | 270071                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| 24 The armature of gen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | erator h   | as 150 turns an           | d its area   | 200 cm2. If i       | t rotates wit    | h frequency 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| in 0.15 T magnetic fi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | eld, the n | aximum-emf i              | nduced is:   |                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (a) 170 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (b         | 340 V                     | (c)          | 65.V                | (d)              | 85 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
| 5. The induced current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                           |              |                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (a) Decreases the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | magnetic   | flux through the          | circuit      |                     | distance An      | S. W. Hampingon                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (b) Increases the n                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | nagnetic   | flux through the          | circuit      |                     |                  | 2 mil 1 of 1001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (c) May increase (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | or decreas | se the magnetic           | flux throug  | h the circuit       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (d) Lange the ma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | metic flu  | x through the ci          | reuit uncha  | inged -             |                  | Henry Land                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |  |  |  |
| 6. Instantaneous value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | falterns   | ting voltage pr           | oduced by    | A.C general         | tor is given     | by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |
| (a) $V_0 \cos \omega t$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | *(h)       | V _o tan ω t    | (c)          | $V_0 \sin \omega t$ | (d)              | V _o sec ω t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| 7. If the speed of rotation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | - of o mo  | nerator is doub           | ded the ou   | tout voltage        | will be:         | corab ad I'm 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)        | Double                    | (c)          | Four time           | (d)              | One half                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| (a) Remain same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                           |              |                     | (,3)             | ind the state                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
| . Mutual inductance ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | is a prac  | iicai roie in per         | (b)          | Radio chok          |                  | To The office                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
| (a) AC generator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            | -                         |              | Transforme          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (c). DC generator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |                           |              |                     |                  | distance which                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| If we make the magne                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | tic field  | stronger, the va          | (b)          | Increased           | amanda val       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (a) Decreased                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1          |                           | (d)          | Kept consta         | nt dischir       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (c) Vanished                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |            |                           | (u)          | Kept consta         | v seta The       | AND THE REAL PROPERTY.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| Henry is unit of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |                           | · (b)        | Mutual indu         | ctance           | CALL S SE CHIEFE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |  |  |
| (a) Self inductance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | e only     |                           |              | emf                 |                  | (ic) Ast                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| (c) Both a and b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |                           | (d)          | VIII.               |                  | Walls In                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |  |  |  |
| Which of the following                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | remain     | s unchanged in            | transform    | ier?                | (4)              | All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | Current                   | (c)          | Power               | (a)              | All Qi tilese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
| In step up transformer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                           |              |                     | (4)              | Va > Va                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |
| (a) $V_S/V_p = 1$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (b)        | Vs < Vp                   | (c)          | $V_S = V_p$         | (d)              | vs-vp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
| If the flux passing thou                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | gh a coil  | per unit time i           | s doubled    | then motion         | al emi also      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| (a) Halvas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (b)        | Triples                   | (c)          | Doubles             | (a) Rem          | ains unchanged                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| The 220 Volts mains ap                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ply is st  | epped down to             | 11 volt, w   | hat is the tra      | nsformation      | ration?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |
| (a) 1:20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (b)        | 20:1                      | (c)          | 1:2                 | (d)              | 2:5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |
| Core of transformer is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |                           |              | INC TOTOGET         |                  | EAST AND ADDRESS OF THE PARTY O |  |  |  |
| (a) Copper                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (h)        | Aluminum                  | (c)          | Iron                | (d)              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| If number of loops are                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | increase   | I than according          | g to Fara    | lay law             | will increas     | se:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |  |  |
| The state of the s | 71.3       | Elastria field            | 101          | Magnetic fiel       | a (a)            | All Of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | with achienen             | neter is ke  | ent stationar       | y in a magi      | netic field whose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  |
| A coil of metal wire co<br>magnitude is continuou                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ely chan   | ing and direct            | ion is aiwa  | ivs per penuiv      | Cultur to breeze |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ed in the  | coil                      | (b)          | A current is in     | nduced in the    | coil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | current i  | s induced                 | (d)          | Both A and B        |                  | Marine Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | muuccu                    | (5)          |                     |                  | 24-410                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
| The unit of induced e.m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | .f. 15:    |                           | 6            | Valt                | (d)              | Weber                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |  |
| (a) Ampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (b)        | Watt                      | (c)          | VOIL                | u to a moon      | etic field. If the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |  |  |
| A wire of length 1.0 m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | moves w    | ith a speed of            | 10 ms 1      | perpendicula        | r to a magn      | iene neidi ii                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |  |
| emf induced in the wire                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | is 1.0 V,  | the magnitude             | of the field | 118:                |                  | Market Barrier                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |  |  |
| (a) 0.01 T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (b)        | 0.2 T                     | · (c) (      | 0.1 T               | (d) (            | 1,02 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                           |              | 12 - 19 10 13       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            | A STATE OF THE PARTY OF   |              |                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |                           |              |                     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |  |
| 22 24 25 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            | 28 20 30                  | 31 32        | 33. 34.             | 35. 36.          | 37. 38. 39.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  |  |

|     |                     |     |     |     |     |     |      |     |     |     |     | 1.00 |     |     |     | -   | 1 -0 | 20  |
|-----|---------------------|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|
|     | Sr.                 | 23. | 24. | 25. | 26. | 27. | 28.  | 29. | 30. | 31. | 32. | 33.  | 34. | 35. | 36. | 37. | 38.  | 39. |
| 200 | Sr.<br>Ans:         | - d | a   | c   | . с | b   | d    | b   | c   | c   | d   | c    | a   | c   | d   | d   | c    | c   |
|     | HER SANSON CONTROLS | -   | **  | -   | 100 |     | 0.00 |     |     |     | -   | _    | -   | -   | -   |     |      |     |

By AZHAR IQBAL 0336-7098894 NMDCAT PREP BOOK

|                                                                           | NETIC INDUCTION Zayan Pu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | blisher |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| 40. A coil is rotated in a uniform magnetic fie                           | eld about an axis perpendicular to the field T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | he emf  |
| induced in the coll would be minimum when                                 | n the plane of the coil is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ne cini |
| (a) Parallel to the field                                                 | (b) Perpendicular to the field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |
| (c) At 45° to the field                                                   | (d) None of them                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |
| 41. Which of the following is not present in A.C.                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (a) Slip rings (b) Carbon brush                                           | hes (c) Magnetic field (d) Split rings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |         |
| 42. In A.C generator, when coil is parallel to may                        | gnetic field the induced current is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |
| (a) Maximum                                                               | (b) Minimum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |
| (c) Half of maximum                                                       | (d) Infinite                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| 43. An A.C generator is operating at 50 F frequency/speed of coil is:     | Iz with a coil having 200 turns. The an                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | gular   |
| (a) 3.14 rad s ⁻¹ (b) 314 rad s ⁻¹                  | THE RESIDENCE OF THE PARTY OF T |         |
|                                                                           | (c) 628 rad s ⁻¹ (d) 6.28 rad s ⁻¹                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | *       |
| 44. When angle between velocity and magnetic fie                          | eld is 45°, the emf produced by A.C generator is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | :       |
| $(a) \frac{3}{2}$ $(b) \frac{3}{\sqrt{2}}$                                | (c) $\frac{\sqrt{3}}{2}\varepsilon_o$ (d) $\varepsilon_o$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |         |
| 45. A metal rod of length 4 m, velocity 5m/s and m                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (a) 10V (b) 20V                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | - 70    |
|                                                                           | (c) 30V (d) 4V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | - 13    |
| 46. A transformer steps down from 200 V to 5 windings in primary coil are | V. It has secondary winding = 40 turns, the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | hen     |
| (a) 150 (b) 160                                                           | (a) 170                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |         |
| 47. For long distance electrical power transmission                       | (c) 170 · (d) 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | - 60    |
| loss in transmission lines:                                               | n, it is necessary to use to minimize pow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ver 🧳   |
| (a) High voltage and high current                                         | (b) Low voltage and birt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |
| (c) Low voltage and low current                                           | (b) Low voltage and high current<br>(d) High voltage and low current                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |
| 48. The voltage received in customer's household w                        | rires is usually in Poliston                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| (a) 66 kV (b) 132 kV                                                      | (c) 220 V (d) 11 LV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| 49. The necessary voltage conversions in electrical p                     | nower transmission system is done by:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |
| (a) Transformer (b) Motor                                                 | (c) Generator (d) Demana                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |         |
| 50. The working principle of transformer is based of                      | n:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |
| (a) Self induction                                                        | (b) Faraday's law                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |
| (c) Mutual induction                                                      | (d) Lenz's law                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |         |
| 51. Transformer possesses:                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (a) Electrically connected two coils                                      | (b) Coils wound on soft iron core                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |
| (c) Magnetically linked two coils                                         | (d) Both B and C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |
| 52. The function of soft iron core in transformer is:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (a) To enhance flux linkages between coils                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (b) To provide medium such that all flux throu                            | igh one coil passes through other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |
| (c) To electrically insulate the two coils                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (d) Both A and B                                                          | of the silversian                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |
| 53. An ideal transformer is the one which has:                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |
| (a) No losses                                                             | (b) Coils with no resistance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |
| (c) Pure inductive coils                                                  | (d) All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |
| 4. In an ideal transformer, the ratio of rate of cha                      | inge of flux in primary to rate of change of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | flux    |
|                                                                           | The state of the s |         |
| (a) Equal to zero                                                         | (b) Greater than one                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |
|                                                                           | (d) Less than one                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         |
| (a) Primary coil                                                          | resistor is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |         |
| (a) Primary coil (b) Tertiary coil                                        | (c) Secondary coil (d) Resistive coil                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |         |

45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. a b d a a c d d d c c

|    |       |        |            | A SALVE TO THE |        |       | I.va | to. |
|----|-------|--------|------------|----------------|--------|-------|------|-----|
| :6 | Dower | losses | in practic | al trans       | former | are c | lue  | 10. |

(a) Eddy currents & Hysteresis loss (c) Flux leakage & Resistance of coils (b) Magnetic loss & Iron loss (d) All of these

57. The percentage efficiency of a transformer can be calculated by:

(a)  $\eta = \frac{P_{out}}{R} \times 100\%$ 

# 58. The power loss due to flux leakage in a transformer can be reduced be:

(a) Using thick wire for winding of the coil

(b) Using laminated iron sheets stacked together as core

(c) Winding the two coils one over another

(d) Using step-up transformer

## 59. In a step-up transformer:

(a) Secondary voltage is greater than primary voltage

(b) Secondary power is greater than primary power

(c) Primary turns are greater than secondary turns

(d) Primary current is lesser than secondary current

60. A transformer steps up 220 volt to 2200 volt. If the secondary coil of a transformer has 100 turns, the number of turns in the primary coil is:

(c) 20

(b) 100 (a) 10 61. If a step up transformer were 100% efficient, the primary and secondary winding would have the

(a) Current

(b) Number of turns (c) Power

62. Step-up transformer has a transformation ratio of 2:3. What is the voltage in secondary, if voltage in primary is 40 V?

(a) 60 V

(b) 90 V

(c) 15 V

(d) 120 V

63. The core of any transformer is laminated so as to:

(a) Reduce the energy due to eddy currents

(b) Make it robust and strong

(c) Make it light weight

(d) Increase the secondary voltage

64. In a transformer, number of turns in primary coil are 140 and that of the secondary coil are 280. If current in primary coil is 8 A, then that of the secondary coil is: (d) 10 A

(b) 6 A

65. A step-up transformer has turn ratio of 25. If the output current is 10 A, the input current is: (c) 35 A (b) 2.5 A 66. The efficiency of a transformer which take input power of 200 W is 80%, the power supplied by

this transformer on load side is:

(b) 140 W

(c) 200 W

67. Step-up transformer has turn ratio of 6:2. What is the voltage in the secondary, if the voltage in primary is 40 V:

(b) 120 V

(c) 60 V

68. In a step-up transformer, the turns ratio is 1:4. A 1.5V battery is connected across the primary. The voltage across the secondary is:

(b) Zero

(c) 0.75 V

69. A step-up transformer operates on a 200 volt line and supplies a current of 2 ampere. The ratio of primary and secondary winding is 1:5. The output voltage in the secondary is:

(a) 200 V

(b) 40 V

(c) 1000 V

(d) 1100 V

|      |     |     |     |     |     |     |     |            |             | 617/19 |     | 1000 |     | 1772200 |
|------|-----|-----|-----|-----|-----|-----|-----|------------|-------------|--------|-----|------|-----|---------|
| Sr.  | = ( | 67  | 50  | 50  | 60  | 61  | 62. | 63.        | 64.         | 65.    | 66. | 67.  | 68. | 69.     |
| Sr.  | 50. | 3/. | 30. | 33. | 00. | 01. | -   | D. Carrier | HISTORY VAL |        | -   | -    |     | c       |
| Ans: | d   | a   | c   | a   | a   | C   | a   | a          | a           | d      | a   | 0    | а   |         |

By AZHAR IQBAL 0336-7098894

UNIT  $10 \rangle$ 

UNIT 10

# **ELECTRONICS**

## PRACTICE TEST NO. 1

1. Peak voltage in the output of full wave rectifier is 10V so DC component of output voltage is

(a)  $10\sqrt{2}$ 

(b)  $20/\sqrt{2}$ 

(c)  $20/\pi$ 

2. Rectifier is a device which converts

(a) AC to DC

(c) AC to triangular current

(b) DC to AC (d) DC to triangular current

3. If a half wave rectifier is used to convert 50Hz. AC into DC, then the number of pulses present in rectifier voltage is

(a) 25

(b) 50

(c) 100

(d) 75

4. A full wave rectifier is operating from 50 Hz mains. Fundamental frequency of ripple will be:

(a) 100 Hz

(b) 25 Hz

(c) 50 Hz

(d) 200 Hz

5. In which rectifier ripple factor is less (a) Full wave

(b) Half wave

(c) Both A and B

(d) None of them

6. In full wave bridge rectification number of diodes required are equal to: (b) 5

(c) 4 7. For a half waver rectifier, the input and output waveforms are shown as:

The time period of the output will be (a) 5 ms (b) 15 ms (c) 10 ms (d) 20 ms

8. A full wave rectifier is being used to rectify an A.C voltage of 110 V, 60 Hz. The number of pulses

of rectified current obtained in five seconds is:

(b) 60 9. In a full-wave center tap transformer rectifier, how many diodes conduct at a time?

(b) 2

(c) 3 (d) 4 10. A half wave rectifier is being used to rectify an A.C voltage of frequency 60 Hz. The number of

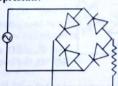
pulses of rectified current obtained in two seconds is:

(b) 240

(c) 120

(d) 30

11. The following circuit represents:



(a) Half wave rectifier

(b) Full waver rectifier

(c) Quarter waver rectifier

(d) None of these

12. The time period of an A.C cycle is 10 s such that it is allowed to go through a bridge rectifier then the frequency of output ripple will be:

(a) 0.5 Hz

(b) 0.2 Hz

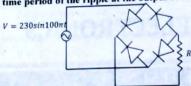
(c) 0.1 Hz

(d) 0.4 Hz

13. The minimum number of diodes required for half wave rectification are:

| (a) 4 |    |    |    | (b) 1 |    |    | (c) 2 |    |    |     | (d) 3 |     |     |  |
|-------|----|----|----|-------|----|----|-------|----|----|-----|-------|-----|-----|--|
| Sr.   | 1. | 2. | 3. | 4.    | 5. | 6. | 7.    | 8. | 9. | 10. | 11.   | 12. | 13. |  |
| Ans:  | c  | a  | a  | a     | a  | c  |       | c  | a  | c   | b     | b   | ь   |  |

MDCAT PREP BOOK



(a) 100 ms

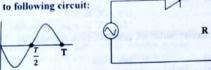
(b) 20 ms

(c) 50 ms

(d) 10 ms

15. The width of depletion region during forward biased mode of a PN-junction diode: (c) Remains same (d) None of these

(b) Increases (a) Decreases 16. If is given to following circuit:



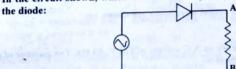
The output voltage during  $0 \rightarrow \frac{T}{2}$  will be:

(a) Positive half

(b) Negative half

(d) A.C

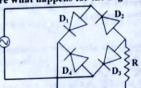
(c) Zero 17. In the circuit shown, which terminal of output becomes negative during the conduction mode of



(a) A

(b) (d) Can not be predicted

(c) Either A or B 18. In the following figure what happens for the negative half cycle of the input?



(a) D₁ and D₃ conduct

D₄ and D₂ conduct

D₁ and D₂ conduct

(d) D4 and D3 conduct

19. Disadvantage of half wave rectification as compared to full wave rectification is:

(a) Signal is not converted to DC

(b) Power of half signal wasted (about 50%)

Pulsating DC is produced

(d) Signal at output becomes triangular AC

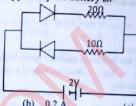
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| Sr.  | 14 | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 17.         | 18.               | 19. |
| Ang. | d  | a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | b           | b                 | Ь   |

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**ELECTRONICS** 

20. In figure, the current supplied by the battery is:



(a) 0.1 A

UNIT 10

(c) 0.3 A

21. The basic reason why a full wave rectifier has twice efficiency then half wave rectifier because:

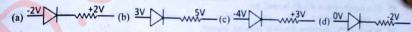
(a) It uses transformer

(b) Its ripple factor is much less

(c) It uses both cycle as input

(d) Output frequency is double the line frequency

22. Which of the following diode is not in reverse biased mode?



23. In the diagram, the input is across the terminals A and C and the output is across the terminals B and D, then the output is:



(a) Zero

(b) Same as input

Half wave

24. If a full wave rectifier circuit is operating from 50 Hz mains, then the time period of output ripples will be:

(a) 10 ms

(b) 40 ms

(c) 50 ms

(d) 80 ms

25. The output voltage of a rectifier is:

(a) Straight line

(b) Smooth

(c) Pulsating

(d) None of these

26. A half wave rectifier is being used to rectify an alternating voltage of 50 Hz. The no. of pulses of rectified current obtained in one second is:

(c) 100

27. In half wave rectification, diode conducts for:

(a) Positive half cycle of A.C.

(b) Negative half cycle of AC

(c) Complete cycle of AC

(d) Either +ve or -ve half cycle of A.C

28. The process in which A.C is converted to D.C is called....., and the process in which D.C is converted to A.C is called:

(a) Rectification, rectification (c) Conversion, rectification

(b) Rectification, inversion

(d) Inversion, inversion

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|------------------|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Sr.              | 20.                     | 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. |
| Ans:             | a                       | c   | d   | c   | a   | c   | b   | d   | b   |

## 29. Which one of the following statements is not correct?

- Diode does not obey ohm's law
- PN junction diode symbol shows an arrow identifying the direction of current flow
- (c) Ideal diode is an open switch
- (d) Diode is an ideal one way conductor

#### 30. In comparison of a half wave rectifier, the full wave rectifier gives higher: Average output voltage (d) All of these

- (a) Efficiency (b) Average dc 31. The reverse biasing in a PN-junction diode:
  - (a) Decrease the potential barrier
- (b) Increase the potential barrier
- (c) Increase the number of minority charge
- (d) Increase the number of majority charge

## 32. The cause of the potential barrier in a PN-junction diode is:

- (a) Depletion of positive charges near the junction
- (b) Concentration of positive charges near the junction
- (c) Depletion of negative charges near the junction
- (d) Concentration of positive and negative charges near the junction

#### 33. The pn-junction diode is used as:

- (a) Amplifier
- (b) Rectifier
- (c) Oscillator
- (d) All of these

#### 34. When a PN-junction diode is reverse biased:

- (a) Electrons and holes are attracted towards each other and move towards the depletion region.
- (b) Electrons and holes move away from the junction depletion
- (c) Height of the potential barrier decrease
- (d) No change in the current takes place

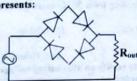
# 35. The electrical circuit used to get smooth dc output from a rectifier circuit is called:

- (a) Oscillator
- (b) filter
- (c) Amplifier
- (d) Logic gates

#### 36. In a PN-junction diode:

- (a) The current in the reverse biased condition is generally very small
- The current in the reverse biased condition is small but the forward biased current is independent of the biasing voltage
- the reverse biased current is strongly dependent on the applied biasing voltage
- (d) The forward biased current is very small in comparison to reverse biased current

#### 37. The following circuit represents:



(a) Half wave rectifier

Full wave rectifier

Quarter wave rectifier

Not a rectifier

## 38. In a full wave bridge rectifier, how many diodes conduct at a time?

- (b) 2
- (c) 3
- 39. If the time period of A.C source applied on the input of full wave rectifier is T1 and time period of the output ripple is To, then the relation between these two is:
  - (a)  $T_0 = 2T_1$
- (b)  $T_0 = \frac{T_1}{\sqrt{2}}$
- (c)  $T_0 = \sqrt{2} T_1$  (d)  $T_1 = 2T_0$

|      |     |     |     |     |     |     |     | diam't like |     | 20      |
|------|-----|-----|-----|-----|-----|-----|-----|-------------|-----|---------|
| Sr.  | 29. | 30. | 31. | 32. | 33. | 34. | 35. | 36.         | 37. | 38. 39. |
| Ans: | d   | d   | b   | d   | ь   | ь   | b . | a           | d   | b d     |

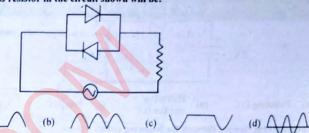
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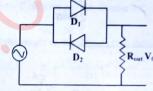
**ELECTRONICS** UNIT 10

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40. The output across resistor in the circuit shown will be:



41. If the diode D₁ is taken off from the circuit, the output across resistor will become?

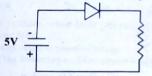


(a) Half wave rectifier

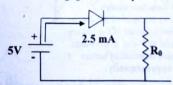
(b) Full wave rectifier

(c) Zero

- A.C
- 42. The potential drop across resistor in following circuit is:



- (a) (5+0.7) V
- (b) (5-0.7) V
- (c) 5V
- (d) Zero
- 43. If the diode resistance is negligible, the output resistance of following circuit Ro= ......



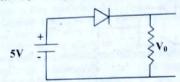
- (a) 1 KΩ
- (b) 3 KΩ
- (c) 2 KΩ
- (d) 5 KΩ

- 44. The rms value of the output of full wave rectifier is:

| Sr. 40. | 41. | 42. | 43. | 44. |  |  |
|---------|-----|-----|-----|-----|--|--|
| Ans: d. | d   | d   | c   | a   |  |  |

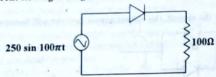
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45. In the following circuit, the output will be about:

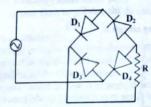


- (a) Pulsating D.C
- rectifier D.C
- (c) Pure D.C
- (d) Pure A.C

46. The rms current flowing through the following circuit will be:



47. In the following figure what happens for the positive half cycle of the input?



- (a) D₁ and D₄ conduct
- D4 and D2 conduct

- D₁ and D₂ conduct
- D4 and D3 conduct
- 48. In the forward bias arrangement of a PN-junction diode;
  - (a) The N-end is connected to the positive terminal of the battery
  - (b) The P-end is connected to the positive terminal of the battery
  - (c) The direction of current is form N-end to P-end in the diode
  - (d) The P-end is connected to the negative terminal of battery
- 49. The potential barrier for silicon diode is approximately:
  - (a) 0.3 V
- (c) 1.1 V
- (d) 1.4 V

- (b) 0.7 V
- 50. PN-junction diode works as a insulator if connected: (a) To A.C
  - (b) In forward bias

(c) In reverse bias

- (d) None of these

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| C | b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ь                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | a                       | b               | c                                           | Ans:                         |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                         |                 |                                             | STATE OF THE PERSON NAMED IN |

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PRACTICE TEST NO. 2

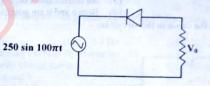
1. In the circuit shown, the output across resistor during  $(\frac{T}{r} - T)$  is:



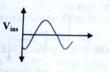
- (a) Positive pulse
- (b) Zero
- (c) Negative pulse
- 2. In half wave rectifier, if the time period of input A.C is 50 ms, then the frequency of ripple at output in hertz is:
  - (a) 50

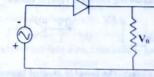
UNIT 10

- (b) 30
- (c) 40
- (d) 20
- 3. The time period of the ripple at the output of the following circuit is:



- (a) 100 ms
- (b) 20 ms
- (c) 50 ms
- (d) 10 ms
- 4. In a half wave rectifier, when diode gets reverse biased, the voltage across its terminals:
  - (a) Become zero
  - (c) Becomes equal to potential barrier
- (b) Becomes equal to source voltage
- (d) None of these
- 5. The output of the following rectifier circuit will be:











- 6. The electrical resistance of depletion layer is larger because:
  - (a) It has no charge carriers

- (b) It has a large number of charge carries
- (c) It increases the number of minority charge carriers
- (d) Increases the number of majority charge carries
- 7. In a junction diode, the holes are due to:
  - (a) Protons
- (b) Neutrons
- (c) Extra electrons

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | electrons |    |  |  |  |  |  |
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| 5.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 6.        | 7. |  |  |  |  |  |
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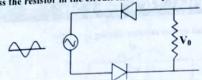
MDCAT PREP BOOK

Ans:

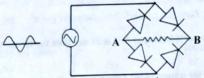
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be:

8. The output across the resistor in the circuit shown for positive half of A.C source will be:

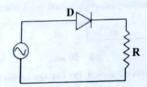


- (a) Positive pulse
- (b) Negative pulse
- Zero for both halves of A.C.
- (d) Pure D.C
- 9. The direction of current through the resistor in the circuit shown during negative half of A.C will



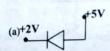
(a) From A to B

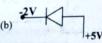
- No current flows during negative half
- Both a and b are possible
- (c) From B to A
- 10. During the positive half of A.C the diode in the circuit is:

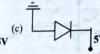


- (a) Forward biased (b) Open
- (c) Reverse biased
- (d) None of these

11. Which of the following diodes is reverse biased?

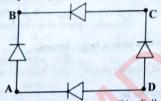








12. I n the diagram shown, the input is applied between A and C and output is across B and D. Then the output is:



(a) Half wave rectifier

(b) Full wave rectifier

(c) Zero

(d) Same as input

| Sr.  | 8. | 9. | 10. | 11. | 12. |
|------|----|----|-----|-----|-----|
| Ans: | b  | c  | a   | C   | b   |

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13. The output of the following circuit will be:



- (a) Pulsating full wave rectified D.C.
- (b) Sinusoidal A.C.
- (c) Pulsating half wave rectified D.C.
- (d) Zero
- 14. The approximate ratio of resistance in the forward and reverse bias of the PN-junction diode is: (a)  $10^2:1$ (b) 10⁻²:1 (c) 1:10⁻⁶ (d) 1:106
- 15. The resistance of a reverse biased PN-junction diode is about:
  - (a) 1 ohm

UNIT 10

- (b)  $10^2$  ohm
- (c) 10³ ohm

- 16. Function of rectifier is:
  - (a) To convert ac into de

(b) To convert de into ac

(c) Both a,b

- (d) To give constant D.C
- 17. If a full wave rectifier circuit is connected from 50 Hz mains, the fundamental frequency of the riple will be:
  - (a) 50 Hz
- (b) 70.7 Hz
- (c) 100 Hz
- (d) 25 Hz

(d) 106 ohm

- 18. In forward biasing current flows due to:
  - (a) Majority charge carriers
- (b) Minority charge carriers
- (d) lons
- 19. A diodes characteristics curve is a plot between:
  - (a) Voltage and time

(b) Voltage and current

(c) Current and time

(c) Both a and b

- (d) All of these
- 20. In full wave bridge rectifier, minimum number of diodes required are: (a) Only one (b) Two
- (c) Three 21. Slope of the reverse characteristics of a PN-junction represents its:
- (d) Four
- - (a) Conductance
- (b) Conductivity

- (d) Resistivity
- (c) Resistance 22. The ratio of potential barrier for Ge to Si at room temperature is:

- 23. The process in which alternating current is converted into direct current is called:
  - (a) Rectification
- (b) Amplification
- (c) Inversion
- (d) Complementation
- 24. In full wave rectification with a center tapped transformer, how many minimum diodes are required:
- (b) 3

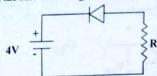
- 25. If the frequency of A.C in half wave rectifier is "f" and period is T then after rectification the product of rectified signal's frequency & period is:

- (d) 1
- 26. A semiconducting device is connected in a series circuit with a battery and a resistance. A current is found to pass through the circuit. If the polarity of the battery is reversed, the current drops to almost zero. The device may be:
  - (a) A p-n junction diode

- (b) An n-type semiconductor
- (c) A p-type semiconductor
- (d) An intrinsic semiconductor

| Sr.<br>Ans: | 13. | 14. | 15.  | 16. | 17. | 18. | 19. | 20. | 21. | 22. | 23. | 24. | 25. | 26. |
|-------------|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans:        | d   | d   | d    | a   | c   | a   | b   | d   | a   | a   |     | a   | d   | 2   |
| DCAT DE     | EDD | OOL | 2225 |     |     |     |     |     |     |     |     | a   | u   | a   |

27. In figure, the current through the resistor is practically:



(b) 1 A

(b) 100

(d) Zero (c) 2 A

28. A half-wave rectifier is being used to rectify an alternating voltage of frequency 50 Hz. The number of pulses of rectified current obtained in two seconds is

(a) 50

(c) 25

(d) 200

29. Which device is used for conversion of A.C into D.C?

(a) Transformer

(b) OP-Amp

(d) OR-Gate

(c) Semiconductor Diode

30. Conversion of alternating current into direct current is called:

(c) Rectification

(d) None of these

(b) Modulation 31. Output voltage of a rectifier is not smooth. It can be made smooth by using a circuit known as: (a) Amplification

(a) Wheat stone circuit

(b) Ripple circuit (d) Filter circuit

(c) Bridge circuit

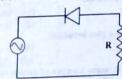
32. In a half wave rectifier circuit, the ratio of resistance of diode during conduction half of A.C to its resistance during blocking half is of the order of:

(a) 1:10⁶

(b) 1:10³

33. For the circuit shown:





Rectified output will be zero across resistor during

, if the input A.C waveform is as

(a)  $\left(0 \to \frac{T}{4} \text{ and } \frac{3T}{4} \to T\right)$ 

following:

(c)  $\left(0 \to \frac{T}{4} \text{ and } \frac{T}{2} \to \frac{3T}{4}\right)$ 

34. Most useful type of rectification is/are:

(a) Half wave rectification

(b) Full wave rectification

(d) Both A and B

(c) Quarter waver rectification 35. In a half wave rectifier, when diode gets forward biased, the voltage across its terminals:

(a) Becomes zero

(b) Becomes equal to source voltage

(c) Becomes equal to potential barrier

(d) None of these

36. Ripple factor of half wave rectifier is (a) 1.21

(b) 0.8

(c) 0.6

(d) -0.4

37. Maximum efficiency of half wave rectifier is

(a) 80.6%

(b) 40.60%

(c) 70%

(d) 50%

38. The output voltage of a rectifier is

(a) Smooth

(b) Pulsating

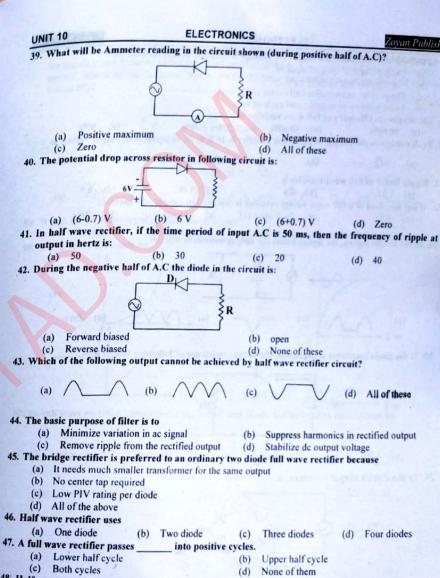
(c) Perfectly direct

(d) Alternating

36. 33. 32. 30. 31. d

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48. Half wave rectifier passes only:

(a) Lower half cycle

(b) Both cycles

(c) Upper half cycle

(d) Either lower or upper

| Sr.  | 39. | 40. | 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Ans: | c   | a   | c   | a   | ь   | c   | d   | a   | С   | d  |

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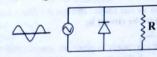
# 49. In half wave rectification, the output DC voltage is obtained across the load for

- (a) The positive half cycle of input AC
- (b) The negative half cycle of input AC
- (c) The positive and negative half cycles of input AC
- (d) Either positive or negative half cycle of input
- 50. The maximum efficiency of full wave rectifier is
  - (b) 40.60% (a) 80.60%

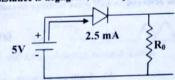
(c) 70%

- (d) 50%
- 51. Peak voltage in the output of half wave rectifier is 10 V so dc component of output voltage is
  - (a)  $10\sqrt{2}$
- 10
- $10/\pi$
- $10\pi$

- 52. Ripple factor of full wave rectifier is
  - (a) 1.21
- (c) 0.482
- (d) 0.9
- 53. If any one diod of a full wave bridge rectifier is removed its output will become:
  - (a) A.C
- (b) Half wave D.C
- (c) Smooth D.C
- (d) Zero
- 54. In the circuit shown, the figure below the output waveform will be:

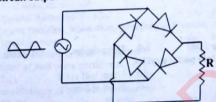


- 55. If the diode resistance is negligible, the output resistance of following circuit Ro=......



- (a) 1 KΩ
- (b) 3 KΩ
- (c) 2 K \O
- (d) 5 KΩ

56. In the circuit output waveform is



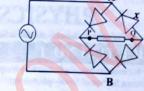
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|------|-----|-----|-----|-----|------|-----|--------------------|-----|
| Sr   | 49. | 50. | 51. | 52. | 53.  | 54. | 55.                | 50. |
| Ans: | d   | a   | c   | c   | c    | a   | C                  | a   |

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57. The circuit shows a bridge rectifier with a sinusoidal alternating voltage applied to it, the output terminals P and Q being joined by a load resister. If diode X were removed leaving a break in the circuit, which of the following traces would be seen on a cathode ray oscilloscope connected across PQ?

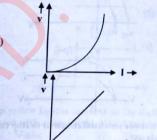
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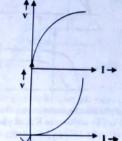


- 58. Which of the following is unidirectional device?
  - (a) Resistor
- (b) Capacitor
- (c) Inductor
- (d) Diode

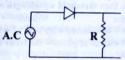
59. I -V graph for a diode is:

UNIT 10





60. In half wave rectifier, shown in the fig. below, they diode will become as open circuit in:



- (a) +ve half cycle
- - (b) -ve half cycle
- (c) Both

(d)

| Sr.  | 57. | 58. | 59. | 60. |
|------|-----|-----|-----|-----|
| Ans: | a   | d   | b   | a   |

# UNIT 11 >>

# **DAWN OF MODERN PHYSICS**

# PRACTICE TEST NO. 1

 A gamma ray photon has frequency 10²² Hz and an X-ray photon has frequency 10¹⁸ Hz. The ratio of the momentum of gamma ray photon to that of X-ray photon is:

(a)  $10^{-4}$ 

(b) 10⁺⁴

(c) 10⁶

2. Which of the following correctly describes the characteristics curves of photoelectric current "L" versus applied voltage for same intensities of light of different frequencies when incident on same metal:

(c)

3. In a phtoelectic experiment, the minimum negative anode potential required to stop the electrons is 5V. The maximum K.E of photoelectrons depends on:

(b) 4.8 x 10⁻¹⁹ J (a) 8 x 10⁻¹⁹ J

(d) 7.6 x 10⁻¹⁹ J (c) 6.4 x 10⁻¹⁹ J

4. The work functions of two different metals "N" and O are 3.2 eV and 1.6 eV respectively. If the threshold wavelength of "O" is 750 nm, then threshold wavelength of metals "N" is:

(a) 375 nm

(b) 1500 nm

(c) 650 nm

(d) 525 nm

5. A metal surface of work function 1.07 eV is radiated with light of wavelength 332 nm. The retarding potential required to stop the escape of photo - electrons is:

(a) 4.81 eV

(b) 2.66 eV

(c) 1.07 eV

(d) 3.74 eV

6. According to the quantum theory, which of the following is correct?

(a) Energy is emitted or absorbed as a continuous wave

Radiation energy from a source is continuous rather than consisting of large number of tiny (b)

particles

Energy is emitted or absorbed in discrete packets (c)

- (d) Intensity wavelength curves obtained from a black body represent line spectrum
- 7. If "E" is the energy of photon, "p" is its momentum, "f" is its frequency, "\lambda" is its wavelength and "c" is its speed, Then which of the following relation is correct?

(a) E=pc

8. The threshold wavelength for a metal show work function is 2 eV is:

(a) 620 nm

(b) 2480 nm

(c) 1240 nm

(d) 620 nm

| Sr.  | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. |
|------|----|----|----|----|----|----|----|----|
| Ans: | c  | b  | a  | a  | b  | c  | a  | a  |

By AZHAR IQBAL 0336-7098894

Photoelectrons are emitted by a metal when photons of wavelength 410 nm are incident. If the K.E of the emitted electrons is to be increased, then:

(a) Intensity of radiation should be decreased

Wavelength of radiation should be increased

Intensity of radiation should be decreased (c)

Wavelength of radiation should be decreased

10. The work function of metal is 7.7 eV and photons of energy 22.5 eV are incident on metal surface. then stopping potential will be:

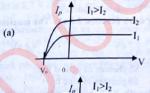
(a) 14.8 V

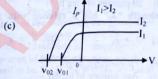
UNIT 11

(b) 15 eV

(c) 13.6 V (d) 14.8 eV

11. Which of the following correctly describes the characteristic curves of photoelectric current "I." versus applied voltage for two intensities "I1" and "I2" of a monochromatic light when incident on same metal:







12. When yellow light is incident on the surface of metal, it emits photo-electrons but there is no such emission with orange light. Which one of these cannot produce emission of photoelectrons?

(b) Blue

(c) Red

13. Let p and E denote the linear momentum and energy respectively of a photon. If the wavelength is increased.

(a) p decreases and E increases

(b) p increases and E decreases

(c) Both p and E increase

(d) Both p and E decreases

14. In a photoelectric emission experiment a metal surface in an evacuated tube was illuminated with monochromatic light. If the experiment were repeated with light of the same wavelength, but of twice the intensity, which of the following would be true?

(a) The photon energy is doubled

The maximum kinetic energy of the ejected electrons is doubled

(c) The work function of the metal becomes halved

(d) The photocurrent is doubled

15. Dual nature of radiation is shown by:

(a) Diffraction and interference

(b) Refraction and diffraction

(c) Photoelectric effect alone

(d) Photoelectric effect and diffraction

16. When the frequency of the incident light is equal to or greater than the threshold value then there will be:

Spontaneous emission of photoelectrons (c) Simulated emission of photoelectrons

(b) Thermionic emission of photoelectrons (d) Induced emission of photoelectron

17. Compton's shift in wavelength ( $\Delta\lambda$ ) is zero, when scattered angle of photon is:

(a) 90° (b) 180° (c) (d) 45° 12. 13. 14. 15. 16. 17. Ans: d

| 19. A process in whe positron when i (a) Photoel (c) Comptoel (c) Comptoel (d) The photoel (e) Work fit (for the photoel (e) Work fit (for the photoel (e) The photoel (for the pho       | (c) Compton's effect 2. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (c) The photoelectric current will increase (d) The stopping potential will decrease is called:  (a) Critical frequency (c) Work function (a) Critical frequency (c) Work function (d) The stopping potential will increase (d) The stopping potential will decrease (d) Threshold frequency (d) Threshold frequency (a) Let $\mathbf{a}$ Critical frequency (b) Intermediate frequency (d) Threshold frequency (d) Threshold frequency (d) 4.4 eV (d) 4.4 eV (e) (1.7 eV (d) 4.4 eV (e) (1.7 eV (d) 4.4 eV (e) (2.5 type decrease) (e) Aphotons of green light (d) So photons of byellow light (e) So photons of yellow light (e) So photons of yellow light (e) So photons of byellow light (e) So photons of yellow light (e) So photons of byellow light (e) So photons of yellow light (e) The stopping potential will increase (e) A set an a relation with incide wavelength (e) Aphotons of prease (e) Aphotone found that scattered wavelength (f) Aphotone found that scattered wavelength (g) Aphotone found that scattered wavelength (he found the found that scattered wavelength (he found the found that sc                                                                                                                                                                                                               | NMD      | CAT    | PREP I              | 3001   | (       | May d   | 100         |                  | 400               |         |                     | 1                                       | By AZ              | CHAR    | IQB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AL    | 0336                           | -/0980 |
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| 19. A process in whe positron when i (a) Photoel (c) Comptoel (c) Comptoel (c) The photoel (c) Work fit (c) Work fit (c) Work fit (c) Stophotoel (c) The photoel (c) X-ray pour (c) X-      | (a) Transformer (b) Semicolation disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation  (c) Compton's effect  (d) Pair production  (e) The wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop  (b) The stopping potential will decrease (d) The stopping potential will decrease (d) The stopping potential will discrease (d) The stopping potential will increase (d) The stopping potential will decrease (d) The stopping potential will increase (d) The stopping potential will decrease (d) The stopping potential will increase (d) The stopping potential will increase (d) The stopping potential will decrease (d) The stopping potential will increase (d) The stopping potential will decrease (d) The stopping potential will decrease (d) The stopping potential will increase (d) The stopping potential will decrease (d) The stopping potential will decrease (d) The stopping potential will increase (d) The stopping potential will decrease (e) The photons of great extends the stopping potential will decrease (d) The stopping potential will decrease (d) The stopping potential will decrease (e) The photons of great extends the stopping potential will decrease (d) The stopping potential will decrease (d) The stopping potential will decrease (d) The stopp                                                                                                                                                                                                                     | 1        | Ans:   | C                   | d      | d       | d       | b           | d                | C                 | d       | c                   | 1000                                    | 1000               |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                |        |
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| 19. A process in whe positron when i (a) Photoel (c) Comptoel (c) Comptoel (d) The photoel (e) Work fit (for the photoel (for th       | <ul> <li>(a) Transformer (b) Semicolation diode (b) A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called: <ul> <li>(a) Photoelectric effect (b) Pair annihilation</li> <li>(c) Compton's effect (d) Pair production</li> </ul> </li> <li>(a) The photoelectric current may stop (c) The photoelectric current will increase (d) The stopping potential will decrease (e) The photoelectric current will increase (d) The stopping potential will discrease (a) Critical frequency of incident light required to emit photoelectrons from the metal surfact is called: <ul> <li>(a) Critical frequency (d) Threshold frequency</li> <li>(b) Intermediate frequency</li> <li>(c) Work function (d) Threshold frequency</li> <li>(d) Threshold frequency</li> <li>(e) Work function (a) 1.4 eV (c) 1.7 eV (d) 4.4 eV</li> </ul> </li> <li>22. A photon of energy 3.4 eV is incident on a metal having work function 2.3 eV. The maximum K of photo-electrons is equal to: <ul> <li>(a) 1.4 eV (b) 1.1 eV (c) 1.7 eV (d) 4.4 eV</li> </ul> </li> <li>23. Which of the following has greatest energy content? <ul> <li>(a) 50 photons of green light (b) 50 photons of yellow light (c) 50 photons of green light (d) 50 photons of blue light (e) 50 photons of broange light (d) 50 photons of blue light (e) 50 photons of broange light (e) The photon is the particle, which has: <ul> <li>(a) λ_x &lt; λ_i (b) λ_x = λ_i (c) λ_x &gt; λ_i (d) λ_x ≤ λ_i (d) A &amp; C are correct</li> </ul> </li> <li>24. Arthur Holy Compton found that scattered wavelength "λ_x" has a relation with incide wavelength "λ_x" as: <ul> <li>(a) Compton effect (b) Wave length (c) Frequency (d) Intensity</li> </ul> </li> <li>25. The converse effect of pair production is: <ul> <li>(a) Compton is the particle, which has:</li> <li>(a) Infinite rest mass (c) No rest mass &amp; no charge</li> </ul> </li> <li>26. The photon is absorbed by a electron</li></ul></li></ul> | 33. Pl   |        |                     |        | name    |         |             |                  |                   |         | (-)                 | 14-                                     | llau               |         | (d)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N     | lone of                        | these  |
| 19. A process in whe positron when i (a) Photoel (c) Comptoel (c) Comptoel (d) The photoel (e) The photoel (f) The photoel (f       | (a) Transformer (b) Semiconductor doctor doctor of the process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation  (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current will increase (d) The stopping potential will decrease (a) The photoelectric current will increase (d) The stopping potential will increase (d) Threshold frequency (d) Threshold frequency (c) Work function (a) 1.7 eV (d) 4.4 eV (c) 1.7 eV (d) 4.4 eV (d) (a) 1.7 eV (d) 4.4                                                                                                                                                                                                                       |          |        | Light               | spee   | d       |         |             |                  |                   |         | (d)                 | Mom                                     | entun              | погр    | noton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                |        |
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Wave theory of light is unable to prove</li> <ul> <li>(a) Black b</li></ul></ul></li></ul>                                                                                                      |          | 1      |                     |        |         |         |             |                  |                   |         |                     |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       | 17 10                          |        |
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| <ol> <li>A process in when i (a) Photoel (c) Compter (c) Compter (d) Photoel (d) Phot</li></ol> | <ul> <li>(a) Transformer (b) Semiconductor diode</li> <li>(b) A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called: <ul> <li>(a) Photoelectric effect</li> <li>(b) Pair annihilation</li> <li>(c) Compton's effect</li> <li>(d) Pair production</li> </ul> </li> <li>(a) Photoelectric effect</li> <li>(b) Pair annihilation</li> <li>(c) Compton's effect</li> <li>(d) Pair production</li> <li>(e) The wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then: <ul> <li>(a) The photoelectric current may stop</li> <li>(b) The stopping potential will decrease</li> </ul> </li> <li>(c) The photoelectric current will increase</li> <li>(d) The stopping potential will increase</li> <li>(e) The minimum frequency of incident light required to emit photoelectrons from the metal surfatis is called: <ul> <li>(a) Critical frequency</li> <li>(b) Intermediate frequency</li> <li>(c) Work function</li> </ul> </li> <li>(d) Threshold frequency</li> <li>(e) Work function</li> <li>(a) 1.4 eV</li> <li>(b) 1.1 eV</li> <li>(c) 1.7 eV</li> <li>(d) 4.4 eV</li> </ul> <li>(a) 1.4 eV</li> <li>(b) 1.1 eV</li> <li>(c) 1.7 eV</li> <li>(d) 4.4 eV</li> <li>(e) 50 photons of green light</li> <li>(f) 50 photons of yellow light</li> <li>(g) 50 photons of orange light</li> <li>(g) 50 photons of blue light</li> <li>(g) 50 photons of orange light</li> <li>(g) 50 photons of blue light</li> <li>(g) 50 photons of orange light</li> <li>(g) 3.5 λi</li> <li>(g) λs λi</li> <li>(g) Notoelectric effect</li> <li>(g) Photoelectric effect</li> <li>(h) Annihilation of matter</li>                                                                                                                                                                                                                                                                                       | 26. Th   | he ph  | oton is             | the r  | partic  | le, w   | hich h      | as:              |                   |         |                     | STATE OF                                | AVEZ /             | 4.7     | na aba                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -00   | w sais                         |        |
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(a) 50 photons of green light (b) 50 photons of yellow light (c) 50 photons of orange light (d) 50 photons of blue light (e) 50 photons of orange light (f) 50 photons of blue light (h) 50 photons of blue light                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |          |        |                     |        | 9 141   | (t      | ) \ \lambda | - λ _i |                   |         | (c)                 | $\lambda_s >$                           | $\lambda_i$        |         | (0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1)    | $\Lambda_{\rm S} \leq \Lambda$ | i      |
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| ngth "              | " as   |         |         |             |                  |                   |         |                     |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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Art  | rthur  | Holy                | Con    | npton   | fou     | nd th       | at s             | catter            | red w   | vavele              | ength                                   | "A,"               | nas     | a rei                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | atio  | n with                         | men    |
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A J  | photo  | on of e             | nergy  | 3.4     | ev is   |             | one of           |                   |         |                     |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                |        |
| 19. 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A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production (e) Compton's effect (d) Pair production (e) The wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (c) The photoelectric current will increase (c) The photoelectric current will increase (d) The stopping potential will decrease The stopping potential will increase (e) The minimum frequency of incident light required to emit photoelectrons from the metal surfairs called: (a) Critical frequency (b) Intermediate frequency  Threshold frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          | (c)    | Work                | func   | uon .   | Wie     | incide      | ent o            | n a m             | etal h  | aving               | work                                    | func               | ction   | 2.3 eV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | . Th  | e maxi                         | mum    |
| 19. A process in when is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (a) Transformer (b) Semiconductor drotted  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (b) The stopping potential will decrease (c) The photoelectric current will increase (d) The stopping potential will increase  21. The minimum frequency of incident light required to emit photoelectrons from the metal surfair is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |        |                     |        |         |         |             |                  |                   |         | (4)                 | Thre                                    | shole              | frequ   | uency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |                                |        |
| 19. A process in when i positron when i (a) Photoel (c) Comptoel (d) Photoel (      | (a) Transformer (b) Semiconductor drotted  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (b) The stopping potential will decrease (c) The photoelectric current will increase (d) The stopping potential will increase  21. The minimum frequency of incident light required to emit photoelectrons from the metal surfa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | is c     |        |                     | 10     |         |         |             |                  |                   |         | (b)                 | Inte                                    | rmedi              | ate fr  | equeno                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | cy    |                                |        |
| 19. A process in when i positron when i (a) Photoel (c) Compto 20. If the waveleng 4000 A, then:  (a) The photoel (a) The photoel (b) and (c) the control (c)       | (a) Transformer (b) Semiconductor drote  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (b) The stopping potential will decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          |        |                     | ireq   | uene    | y 01 1  | nerue       | ng               |                   |         |                     |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                |        |
| 19. A process in when i positron when i (a) Photoel (c) Compto 20. If the waveleng 4000 A, then:  (a) The photoel (a) The photoel (b) and (c) the control (c)       | (a) Transformer (b) Semiconductor drote  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:  (a) The photoelectric current may stop (b) The stopping potential will decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |          | (c)    | The p               | notoe  | necui   | v of i  | ncide       | nt lie           | ht rec            | uire    | d to e              | mit p                                   | hotoe              | lectro  | ons fro                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | om t  | he met                         | al sur |
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If the waveleng                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (a) Transformer (b) Semiconductor drotte (c)  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A 4000 A, then:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |        |                     |        |         |         |             |                  |                   |         | (4)                 | The                                     | stonn              | ine p   | otentia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | l wi  | Il incre                       | ase    |
| 19. A process in who positron when i  (a) Photoel  (c) Compto com      | (a) Transformer (b) Semiconductor drote (c)  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect (b) Pair annihilation (c) Compton's effect (d) Pair production  20. If the wavelength of incident radiation in a photoelectric experiment is decreased from 6000 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 400      | 000 A  | , then:             | hates  | lactri  | e cur   | rent m      | av st            | op                |         | (b)                 | The                                     | stopp              | ing p   | otentia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | l wi  | II decre                       | ease   |
| 19. A process in who positron when i (a) Photoel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (a) Transformer (b) Semiconductor drote (c)  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect  (b) Pair annihilation  (d) Pair production                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20. If t | the w  | vavelen             | gth (  | or inc  | ident   | Lauta       | on               | P                 |         |                     |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                |        |
| 19. A process in who positron when i (a) Photoel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (a) Transformer (b) Semiconductor drote (c)  19. A process in which a high energy gamma ray photon disappears by producing an electron and positron when it passes close to heavy nucleus is called:  (a) Photoelectric effect  (b) Pair annihilation  (d) Pair production                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |          | (c)    | Comp                | ton's  | effec   |         | -ndia       | tion             | in a n            | hoto    | electr              | ic exp                                  | erim               | ent is  | decre                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ase   | d from                         | 6000   |
| 19. A process in who nositron when i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (a) Transformer (b) Semiconductor diode (c)  19. A process in which a high energy gamma ray photon disappears by producing an electron and nositron when it passes close to heavy nucleus is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |        |                     |        |         |         |             |                  |                   |         | (4)                 | Pair                                    | produ              | nction  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |                                |        |
| and the said                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (a) Transformer (b) Semiconductor diode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | pos      |        | n when              | it pa  | isses   | close   | to nea      |                  | ucicu             |         | (b)                 | Pair                                    | annih              | nilatio | n                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| (a) Hansie                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 18. A device that converts light energy into electrical energy is cancel.  (a) Transformer (b) Semiconductor diode (c) Photocell (d) Thermistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 19. A    | proc   | ess in v            | vhich  | a hi    | gn en   | to bor      | gamin            | nelen             | e is co | lled:               |                                         |                    |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |                                |        |
| (a) Transfe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 18. A device that converts light energy into electrical energy is cancel.  (b) Semiconductor diode (c) Photocell (d) Thermistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          | (a)    | Trans               | form   | er (t   | 0) 0    | enneo       | TO TO T          | na ra             | v nho   | ton d               | isapp                                   | ears               | by pr   | oduci                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ng a  | n elect                        | ron a  |
| 18. A device that co                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | that converte light energy into electrical energy is called.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 18. A    | devic  | ce that             | conv   | erts II | girte   | amica       | ndue             | or die            | ode     | (c)                 | Phot                                    | ocell              |         | ((                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1)    | Therm                          | istor  |

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|-----------|-----------|-----------------|-----------------------------------------|--------------------------|-----------|-------------|
| ffect d   | epends    | upon            |                                         | Tak va                   |           |             |
| (b        |           | quency o        | f incide                                | nt light                 |           |             |
| (d        | ) Inte    | nsity of        | incident                                | light                    |           |             |
|           |           | Table           |                                         |                          |           |             |
| (b)       | Opp       | osite dir       | ection                                  |                          |           |             |
| (d)       | Non       | e of thes       | e                                       |                          |           |             |
| atte by   |           |                 |                                         |                          |           |             |
| (c)       | h/A       |                 |                                         | (d) \(\lambda\)          | /h        |             |
|           |           |                 |                                         |                          |           |             |
| (c)       | 2.43      | pm              | (                                       | d) 24                    | 43 nm     |             |
| frequ     | ency g    | reater 1        | than th                                 | reshol                   | d freq    | uency       |
| tal is    | 4.2 eV    | and sto         | pping p                                 | otenti                   | al for    | incide      |
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| (c)       | 5 eV      |                 | (d)                                     | Canno                    | t be pre  | edicte      |
|           | ect dec   | reases it       | f:                                      |                          | 4         |             |
| (b)       |           | xposure         |                                         |                          |           |             |
| (d)       | The ex    | coosure         |                                         |                          |           |             |
| iture (   | of light: |                 |                                         |                          |           |             |
| (b)       |           | ton's eff       | ect                                     |                          |           | 7.00        |
| (d)       | Diffra    | ction           |                                         |                          |           | - 18        |
| t?        |           |                 |                                         |                          |           | -           |
| (b)       |           | tons of         |                                         |                          |           | - 19        |
| (d)       | 20 pho    | tons of         | vellow li                               | ight                     |           |             |
| rom a     | photoc    | ell and         | stoppin                                 | g pote                   | ntial is  |             |
| ng pot    | ential v  | **              |                                         |                          |           |             |
| (c)       |           | Vo              | (d)                                     |                          | Vo        |             |
|           |           | 4               | -                                       |                          | 2         |             |
| cident    | radiat    | ion is re       | duced                                   | from 3                   | 000 A to  | o 200       |
| d's       |           |                 |                                         |                          |           |             |
|           |           | old frequ       |                                         |                          |           |             |
| (d)       | Stoppin   | g poten         | tial will                               | increa                   | ise       |             |
| ic effe   | ect?      |                 |                                         |                          |           |             |
| al to I   | ntensity  | of pho          | tons                                    |                          |           |             |
| minim     | ium inte  | ensity o        | photor                                  | 15                       |           |             |
| s inde    | penden    | t of inte       | nsity of                                | incide                   | ent radi  | ation       |
| y of II   | ght belo  | w which         | h no en                                 | nission                  | occur     | S           |
| graph     | of K.E    | of pho          | toelecti                                | rons ei                  | mitted    | fron        |
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| e er      |           | N N             |                                         |                          |           |             |
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| and in    | ntensity  | of inci         | dent pho                                | otons                    |           |             |
| frare     | d radia   | tion an         | d X-ray                                 | ys.                      |           |             |
| but les   | s than    | infrared        | waves                                   |                          |           |             |
| vacuur    | m         |                 |                                         |                          |           |             |
| rays      |           |                 |                                         |                          |           |             |
|           |           |                 |                                         |                          |           |             |
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| Section 1 | 1. 42     | . 43.           | 44.                                     | 45.                      | 46.       |             |
| . 41      |           | ACCURAGE STREET | 100000000000000000000000000000000000000 | THE RESERVE AND ADDRESS. |           | -           |
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## DAWN OF MODERN PHYSICS

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| ar my at abold    | frequency of a metal is 3 x | 10" Hz. | The w | OFK Tunetion  |        |       |      | -  |
| 47. The threshold | frequency of a mem-         |         | 15)   | 2 10-19 1     |        | (d)   | 2    | .7 |

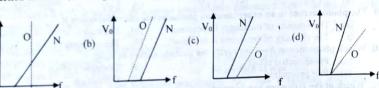
- (a) 1 x 10⁻²⁹ J
- (b) 4.8x10⁻¹⁹ J
- (c)  $2x10^{-19}$  J (d)  $2.7x10^{-19}$  J
- 48. The photoelectric threshold for a metal is 300 nm. If the metal is illuminated with radiation of 400 nm, then the maximum K.E of emitted electrons is:
  - (a) 1.5 eV
- (b) 3.3 eV
- (c) 4.2 eV
- There is no photo emission
- 49. A metal "N" is illuminated by ultraviolet and visible radiation successively and stopping potential is measured. This stopping potential is:
  - (a) More with visible light

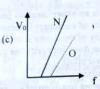
(b) More with ultraviolet light

(c) Equal in both cases

- (d) May A or B
- 50. In a photoelectric experiment, electrons are ejected from metals "N" and "O" by light of frequency f. The stopping potential "V_o" is measured for various frequencies. If "O" has greater work function than "N", which graph illustrates the expected result?









|      | ACCOUNT OF THE        | 48. | 49.                        | 50.            |
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| Ans: | c                     | d   | 0                          | 1 40 2 V 90 0  |

# PRACTICE TEST NO. 2

- 1. The proton and antiproton collision will result:
  - (a) Scattering
- (b) Repulsion
- (c) Attraction
- (d) Annihilation

- 2. Which particle has dual nature?
  - (a) Photon
- (b) Alpha
- (c) Electron
- (d) All of these

- 3. Which group consists of only electromagnetic waves: (a) Microwaves, radio waves, infrared
- (b) Microwaves, radio waves, sound (d) None of these
- (c) Microwaves, water waves, infrared 4. Einstein was awarded Nobel Prize for his work on:

  - (a) Photoelectric effect

- Nuclear fission All are correct
- (c) Theory of relativity 5. Existence of photon was confirmed by:
- (c) Einstein
- (d) Max planck

- (b) De-broglie (a) Compton

- 6. The speed of photons in vacuum is than in liquid water:
  - (a) Higher
- (b) Smaller
- (c) Equal
- (d) None of these
- 7. What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm?  $3.6 \times 10^6$  $1.6 \times 10^{-19}$ (d) (b)  $6.25 \times 10^{18}$ (a) 1
- 8. The momentum of the moving photon is:
  - (a) Zero
- (b) \(\lambda/h\)
- (c) hl
- (d)  $h/\lambda$

- 9. Which light photon has the least momentum
- (d) Blue
- (c) Yellow (b) Green (a) Red 7. 5. 6. Sr. a d a Ans:

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By AZHAR IQBAL 0336-7098894

10. The frequency of the incident photon after Compton effect will

- (a) Remain constant (b) Increases
- (c) Decreases
- (d) None of these
- 11. In Compton's scattering the change in the wavelength is given by:
  - (a)  $\Delta \lambda = \frac{h}{m_o c^2} (1 + \cos \theta)$

(c)  $\Delta \lambda = \frac{hc}{m} (1 - \cos \theta)$ 

12. The change in the wavelength in Compton's effect can be explained on the basis of:

- (a) Classical theory
- (c) Energy band theory

- (b) Quantum theory
- (d) Wave theory 13. According to the quantum theory, which of the following is correct?
  - (a) Energy is emitted or absorbed as a continuous wave
  - (b) Intensity-wavelength curves curves obtained from a black body represent line spectrum
  - (c) Energy is emitted or absorbed in discrete packets
  - (d) Radiation energy from a source is continuous rather than consisting of large number of tiny
- 14. If a surface has work function of 3.00 eV, the longest wavelength of light which will cause the emission of electrons is:
  - (a) 4.876x10⁻⁷ m
- (b)  $4.125 \times 10^{-7}$  m (c)  $5.998 \times 10^{-7}$  m
- (d) 6.847 x 10⁻⁷ m
- 15. The work function of tungsten 4.5 eV. The threshold frequency is:
  - (a)  $1.09 \times 10^{15} \text{ Hz}$  (b)  $1.09 \times 10^{-15} \text{ Hz}$  (c)  $0.91 \times 10^{15} \text{ Hz}$  (d)  $1 \times 10^{16} \text{ Hz}$

- 16. Photoelectric effect shows;
  - (a) Wave-like behavior of light
  - (b) Particle-like behavior of light
  - (c) Both wave-like and particle-like behavior of light
  - (d) None of these
- 17. Photoelectric effect is the phenomenon in which:
  - (a) Photons come out of metal when it is hit by a beam of electrons
  - (b) Photons come out of nucleus of an atom under the action of an electric field
  - (c) Electrons come out of a metal with constant velocity
  - (d) Electrons come out of a metal with different velocities not greater than a certain value
- 18. According to particle model of light, a photon travels with speed equal to:
  - (a) 3 x 106 m s⁻¹ (b) 3 x 107 m s⁻¹
- (c) 3 x 10 m s
- (d) 3 x 108 m s⁻¹

- 19. The time of photoelectron emission is usually:
  - (a) Less than nano-second
- (b) Equal to one micro-second
- (c) Greater than nano-second
- (d) Equal to one mili-second
- 20. Compton shift in the wavelength of photon when it scattered at angle 60° is:
  - (a) h moc
- (b) 3h (c) 2mac
- (d)
- $2m_{o}c$ 21. The particle nature of electromagnetic radiation is suggested by experiments on:
  - (a) The interference experiment
  - (b) Compton's effect
  - (c) The electron diffraction experiment
- (d) The scattering of X-rays by crystalline materials 22. Compton's effect is mainly associated with:
- (a) Gamma rays
  - (b) X-rays
- (c) Beta rays
- (d) Positive rays
- 23. The photon is a radio wave of wavelength 3×108 cm have an energy: (a)  $6.63 \times 10^{-32}$  J
  - (b) 6.63×10⁻²⁸ J
- (c) 6.63×10⁻³⁶
- (d)  $6.63 \times 10^{-30} \text{ J}$

| Sr               |        | 1   |     |     |     | 311.8 | NE L |     |     |     |     |     |     |
|------------------|--------|-----|-----|-----|-----|-------|------|-----|-----|-----|-----|-----|-----|
| Aner             | ). 11. | 12. | 13. | 14. | 15. | 16.   | 17.  | 18. | 19. | 20. | 21. | 22. | 23. |
| Sr. 10<br>Ans: c | d      | b   | c   | Ь   | a   | b     | d    | d   | a   | c   | Ь   | Ь   | a   |

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24. A, gamma ray photon has frequency  $5\times10^{22}$  Hz and an X-ray photon has frequency  $2\times10^{22}$ 1018 Hz. The ratio of the momentum of X-ray photon to that of gamma-ray photon is:

(a)  $4 \times 10^{-5}$ 

(c)  $2.5 \times 10^4$ 

(d)  $4 \times 10^5$ 

25. Stopping potential depends:

- (a) Only upon the energy of incident photon
- (b) Only on the work function of the metal
- (c) On the difference in energy of incident photon and work function of metal
- (d) On the sum of energy of incident photon and work function of metal

26. The energy of a photon is  $9 \times 10^{-19}$  J. Its momentum is: (b)  $10^{-11} kg ms^{-1}$ 

(a)  $10^{-27} \text{ kg ms}^{-1}$ 

(c)  $9.10 \times 10^{-11} \text{ kg ms}^{-1}$  (d)  $3 \times 10^{-27} \text{ kg ms}^{-1}$ 27. Which of the following is correct descending order of wavelength of given electromagnetic radiation?

- (a) Microwaves, short radio waves, infrared
- (b) x-rays, visible, microwaves
- (c) Long radio waves, infrared, ultraviolet
- (d) Ultraviolet, gamma rays, X-rays

28. Visible region of electromagnetic radiation spectrum ranges: https://example.com/

- (a) From 350 nm to 800 nm
- (b) From 400 nm to 600 nm (d) From 500 nm to 700 nm
- (c) From 400 nm to 750 nm 29. Which photon, red, green, indigo or orange carries the least momentum? (c) Orange (d) Green
- (b) Indigo (a) Red
- 30. Which of the following is correct about photoelectric effect? (a) Electrons are emitted if frequency of incident photons is below a critical value

  - (b) Electrons are emitted if wavelength is more than a critical value
  - (c) Speed of photoelectrons is inversely proportional to work function
  - (d) K.E of photoelectrons is directly proportional to intensity incident photon beam
- 31. Photoelectric effect is based on law of conservation of:
  - (a) Charge
- Angular momentum
- Momentum
- (d) Energy

32. Photoelectrons are emitted by a metal surface only when the light incident on it:

- (a) Has wavelength greater than a certain minimum wavelength
- (b) Has frequency less than or equal to certain maximum frequency
- (c) Has wavelength less than or equal to certain maximum wavelength
- (d) May A or C

33. The maximum speed of photoelectrons depends on:

- (a) Threshold frequency of cathode
- (b) Frequency of incident light

(d) All of these

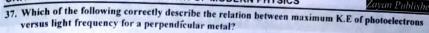
34. In a photoelectric experiment, the wavelength of incident light is increased. Which of the following is the effect of this change on the K.E of emitted electrons?

(a) Average K.E increases

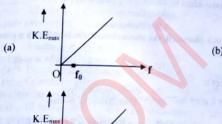
- (b) Minimum K.E decreases
- (c) Maximum K.E increases
- (d) Average K.E decreases

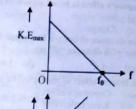
- 35. Which phenomena cannot be explained wave theory of light? (b) Interference
  - (d) Photoeletric effect (c) Polarization
- 36. A photon of energy 3.4 eV is incident on a metal having work function 2 eV. The maximum K.E. of photo- electrons is equal to: (d) 6.8 eV
  - (a) 14eV
- (b) 1.7 eV

| 1 | Sr.       | 24.  | 25. | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33.   | 34. | 35. 36.      |
|---|-----------|------|-----|-----|-----|-----|-----|-----|-----|-----|-------|-----|--------------|
|   | Ans:      | a    | c   | d   | c   | c   | a   | c   | d   | c   | d     | d   | 2226 7098894 |
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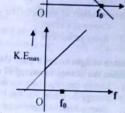


DAWN OF MODERN PHYSICS









38. The momentum of the photon of wavelength 3000 Ao will be:

- (a)  $1.3 \times 10^{-27} \, kg \, ms^{-1}$
- (b)  $2.2 \times 10^{-27} \text{ kg ms}^{-1}$
- (c)  $1.3 \times 10^{-28} \, kg \, ms^{-1}$
- (d)  $2.2 \times 10^{-28} \, kg \, ms^{-1}$
- 39. The correct relation out of following:

- (d) None of these

40. Which photon, red, green, indigo or orange carries the most energy?

(a) Indigo

(c)

UNIT 11

- (b) Orange
- (c) Green

41. Light of frequency 1.5 times the threshold frequency is incident on a photo sensitive surface. If the frequency is halved, the photoelectric current is:

- (a) Doubled
- (b) Halved
- (c) Same
- (d) Reduce to zero

42. A metal surface ejects electrons when incident by blue light but no electron when incident by green light. The electrons will be ejected when the surface is incident by:

- (a) Violet light
- (b) Red light
- (c) Yellow light
- (d) Orange light
- 43. Two photons have wavelength 650 nm and 1300 nm. The ratio of their respective frequencies is: (a) 4:1 (b) 1:1 (c) 1:2 (d) 2:1
- 44. The momentum of a photon of wavelength 100 Å is:
- (a)  $6.63 \times 10^{-26} \text{ Ns}$  (b)  $6.63 \times 10^{-22} \text{ Ns}$  (c)  $6.63 \times 10^{-21} \text{ Ns}$  (d)  $6.63 \times 10^{-28} \text{ Ns}$

45. Photons of energy 6.2 eV are incident on a metal whose work function is 4.2 eV. The K.E of the fastest electrons emitted in joules is:

- (a) 6.8x10⁻¹⁹
- (b) 4.8x10⁻¹⁹
  - (c) 1.6x10⁻¹⁹
- (d) 3.2 x 10⁻¹⁹

46. The frequency of photon of energy 4 eV is of the order of:

- (a) 10¹⁵ Hz
- (b) 10¹¹ Hz
- (c) 10²¹ Hz (d) 10¹⁸ Hz
- 47. The work function of a metal is 3.3 eV. The threshold frequency of that metal will be:
- (a) 8x10¹⁴Hz. (b) 2x10²⁰ Hz 48. The work function for potassium and sodium respectively:
- (c)  $4x10^{14}$  Hz
- (d) 5x10²⁰ Hz

(a) 2.3 eV, 2.7 eV (b) 5.1 eV, 2.3 eV (c) 4.7 eV, 4.3 eV

- (d) 5 eV, 4.8 eV

49. According to particle model of light, a photon is electrically: (a) Neutral (b) Positively charged

- 50. Invisible region of electromagnetic radiation spectrum lies below:
- (d) Negatively charged

| (a) 450 | The same of |     |     | 400 | 132.15 |     |     | 500 |     |     | (-) | 600 |     |
|---------|-------------|-----|-----|-----|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| Sr.     | 37.         | 38. | 39. | 40. | 41.    | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. |

| PRACT | CE TEST | NO. 3 |
|-------|---------|-------|
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|          |                                          | land of conservati                                       | on of:      |                                     | 4              | The state of the s |      |
|----------|------------------------------------------|----------------------------------------------------------|-------------|-------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1.       | Compton's effect is ba                   | ased on law of conservati                                | (b)         | Energy                              |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (a) Momentum                             |                                                          | (4)         | Both a and b                        |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (c) Charge                               | is increased from a pho                                  | tocell, the | photoelectric c                     | arrent         | "I" in a photo co                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ell  |
| 2.       | If the distance of lamp                  | ) is increased from a paid                               |             |                                     |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | varies with distance "                   | a as:                                                    | (0)         | $I \propto \frac{1}{d}$             | (d)            | $I \propto \frac{1}{d^2}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|          | (a) $I \propto d^2$                      | (b) 1 ∝ d                                                | (c)         | d                                   |                | d²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |
| 3.       | The inverse effect of p                  | hotoelectric effect is:                                  |             | IN I tuin of                        | Fact           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
| ٠.       | (a) Compton's eff                        | fect                                                     | (b)         | Photoelectric ef<br>Annihilation of | matter         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (c) X-ray product                        | ion                                                      | (d)         | Annihilation of                     | matter         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          |                                          |                                                          |             | Which                               | of the f       | following correct                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | t Iv |
| 4.       | A photon of light ente                   | rs a glass slab after trave                              | elling thro | ough air. Which                     | or the r       | onowing correct                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ,    |
|          | . Il the change i                        | n energy of the broton:                                  |             |                                     |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (-) Engray increase                      | es because the wavelength                                | of radiati  | on decreases                        |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          |                                          |                                                          |             |                                     | do not         | change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |
|          | ( ) C                                    | cama because the speed                                   | and wavel   | aligni of radiation                 | ne             | The manner                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |
|          | (d) Energy remains                       | same because the frequen                                 | ncy of radi | ation femalis sar                   | cell If        | the red light bea                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | an   |
| 5.       | Electrons are emitted                    | when a beam of red ligh                                  | t falls on  | f the following a                   | uantity        | would decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ?    |
|          | is replaced by a blue l                  | ight beam of same power                                  | r, which o  | Maximum K.E                         | of elect       | rons emitted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
|          | (a) Work function                        | of cathode                                               | (0)         | Number of phot                      | ons stri       | king the cathode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |
|          | (c) Energy of eac                        | n of cathode<br>h photon striking the catho              | ode (u)     | per unit time                       |                | Section 180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |
|          |                                          | 11 di of signi                                           | ed photoe   | lectrons:                           | b 7 100        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
| <b>.</b> | In order to increase th                  | ne kinetic energy of eject                               | en photoc   |                                     |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          |                                          | of radiation should be increth of radiation should be in |             |                                     |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (b) The waveleng                         | of radiation should be in                                | creased     |                                     | de e           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (c) The frequency                        | gth and intensity of radiati                             | ion should  | be increased                        | halele         | ed as                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |
|          | (d) Both waveleng                        | gth and intensity of radiations. The momentum of each    | h nhoton    | is given radiatio                   | n is 3.3       | x10 ⁻²⁹ kg ms ⁻¹ . T                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | h    |
| 7.       | Given $h = 6.6 \times 10^{-5} \text{ J}$ | s. The momentum of cac                                   | n paoten    | and the same                        |                | green lights                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
|          | frequency of radiation                   | (b) 6x10 ¹⁰ Hz                                | (c)         | 7.5 x 10 ¹² Hz           | (d)            | 1.5 x 10 ¹³ Hz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|          | (a) 3x10 Hz                              | ,D have work functions                                   | 2.2.4.2.8   | 3.2 eV. Light o                     | f wave         | length 4000 A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | i    |
| 8.       | Four elements A,B,C                      | elements which emit ph                                   | oto electro | ns are:                             |                | 7 (11)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |      |
|          | A D C D                                  | (b) A B                                                  | (C)         | A. D. C                             | (d)            | Anni od 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|          | (a) A, B, C, D                           | blue, green, infrared or o                               | range car   | ries the most mo                    | mentu          | m?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |
| 9.       | Which photon violet,                     | (b) Rhe                                                  | (c)         | Infrared                            | (d)            | Green                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |
|          | (a) Violet                               | (b) Blue                                                 | on's shift  | equals 30% of C                     | ompto          | n's wavelength                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 01   |
| 10.      | In Compton's scatter                     | ing, the value of Compto                                 |             |                                     | Shill be       | (a) (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |      |
|          | electron when X-ray is                   | s scattered at an angle of<br>(b) 30°                    | (c)         | 60°                                 | (d)            | 90°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |
|          | (a) 45°                                  | (b) 30°<br>ing is correct relation                       | for a ph    | oton (Where sy                      | mbols          | have their usu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | al   |
| 11.      | Which of the follows                     | ing is correct relation                                  | ioi ii pii  | ann a loui                          |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | meanings)?                               | (b) , 1                                                  | (c)         | $\lambda \propto \frac{1}{p}$       | (d)            | All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |
|          | (a) $\lambda \propto \frac{1}{F}$        | (b) $\lambda \propto \frac{1}{l}$                        | (0)         | A W P                               | ALC: UNITED IN |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
| 12       | X-rays production is t                   | he reverse process of                                    |             |                                     |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (a) Pair production                      | n                                                        |             | Compton effect                      |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|          | (c) Photoelectric e                      | effect                                                   | (d)         | A & B are correc                    | t              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
| 13.      |                                          | ired for pair production                                 | is:         |                                     | V PON          | o sti MaV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|          | (a) 939 MeV                              |                                                          | (c)         | 1.02 MeV                            | (d)            | 0.511 MeV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |
|          | G 400 000 (1)                            | 三、田市 医红 子                                                |             | V UNI                               | 1111111111     | 10 10 10 10 10 10 10 10 10 10 10 10 10 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |

| UNIT 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DAWN OF MOD               | DERN PHYSICS                      | Zaran D. Lt.                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------|------------------------------------------------------|
| 14. If Alpha, beta, and gamma ra<br>(a) Alpha rays (b) B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | vs carry the same         |                                   | Zayan Publisher                                      |
| 15 is conserved in pair p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | roduction                 | Gamma rays (d)                    | as the longest wavelength?  All have same wavelength |
| (a) Charge (b)  16. In pair production are p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Momentum                  | (c) energy                        | (d) None of these                                    |
| (a) Positron & electron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Todaccu.                  | (b) Photons                       |                                                      |
| (c) Electrons & neutron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                           | (d) Proton and e                  | laateen                                              |
| 17. Dual nature of light is proved b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | y:                        | (d) Troton and e                  | ectron                                               |
| (a) Davisson and Germans'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | experiment                | (b) Black body r                  | adiation                                             |
| (c) Compton's effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                           | (d) Dhatastastas                  | - CC .                                               |
| 18. Calculate the wavelength of pho                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | oton associated wit       | $h 3 \times 10^{14}$ Hz frequency | iency.                                               |
| (a) 10 micrometer (b)  19. The momentum of white light is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 100 micrometer            | (c) 1 micrometer                  | (d) 2 micrometer                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | High                      |                                   |                                                      |
| 20. What is the frequency of a photo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | n whose sname:            | (c) Equal                         | (d) None of these                                    |
| (a) $12.6 \times 10^{6} Hz$ (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 196 × 106 U-              | (4) 10. 1016.                     |                                                      |
| 21. Calculate the frequency of photo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | n associated with         | (c) $1.6 \times 10^{16} H$        | $z$ (d) $81 \times 10^{16} Hz$                       |
| (a) 3 x 10 Hz (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 6 x 10 ⁽¹⁴⁾ Hz | (c) 7 x 10 ⁽¹⁴⁾ Hz     | (d) 9 x 10 ⁽¹⁴⁾ Hz                        |
| 22. Joule - second is the unit of:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | real trickmas as          | (c) /X 10 HZ                      | (d) 9 x 10 ⁽¹⁴⁾ Hz                        |
| (a) Energy (b) 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Heat                      | (c) Work                          | (d) Planelia                                         |
| 23. The spectrum of white light lies:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | and the late day to       | (e) work                          | (d) Planck's constant                                |
| (a) Above 300 nm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (                         | b) Below 300 nm                   |                                                      |
| (c) In between UV to IR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Conglic months (          | A) N C.t                          | staff beats and                                      |
| 24. The photon when scattered from a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                           |                                   | ME RECEIVE CONTRACTOR                                |
| (c) Remain same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           | ) Half                            | call with the administration                         |
| 25. The concept of work function was                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | given by                  | d) Zero                           |                                                      |
| (a) Bohr (b) Fi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | nstein (a                 | ) Rutherford                      | ALER STATES THE STATES                               |
| 26. In annihilation process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | re produced:              | ) Kumeriora                       | (d) None of these                                    |
| (a) Positron (b) Fl                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ectrons (a)               | Photons                           | (d) Both b & c                                       |
| 27. The existence of positron was disco                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | vered in the              |                                   | (d) Doill to & C                                     |
| (a) Thermal radiation (c) Electromagnetic radiation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (b)                       |                                   |                                                      |
| (c) Electromagnetic radiation 28. Momentum of a photon is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (d)                       | Non electromagne                  | tic radiation                                        |
| h.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                           |                                   |                                                      |
| (a) 0 (b) $\frac{nc}{1}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (c)                       | hf/c                              | (d) $\frac{E}{\lambda}$                              |
| 29. Work function depends on:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                           |                                   | (a) \(\bar{\lambda}\)                                |
| (a) Metals only                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)                       | Nature of surface                 |                                                      |
| (c) Both metals and nature of sur                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | face (J)                  | TL IIIC                           |                                                      |
| Jo. II "E" is the energy of photon, "p"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | is its momentum           | 460 in in C                       | v "2" is its wavelength                              |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | e following relation      | n is not correct?                 | y, A is its wavelength                               |
| (a) L - pc (b) n = -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c)                       | $f = \frac{pc}{}$                 | (d) r-h                                              |
| 31. Which of the following is correct                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | assending and             | h .                               | (d) $E = \frac{h}{\lambda}$                          |
| 31. Which of the following is correct radiation?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ascending order           | of wavelength of                  | given electromagnetic                                |
| (a) Microwaves, short radio wave                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | s, infrared (b)           |                                   |                                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           | Ultraviolet gamma                 | a rays, X-rays<br>, infrared, ultraviolet            |
| adminuation process are                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | produced:                 | Long radio waves.                 | , infrared, ultraviolet                              |
| (D) Flect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | rons (c)                  | Photons                           | (d) Roth h % a                                       |
| Sr. 14. 15. 16. 17. 18. 19.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20. 21. 22. 23.           |                                   | (d) Both b & c<br>28. 29. 30. 31. 32.                |
| mis: d d a a c a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | c b d c                   |                                   |                                                      |
| MDCAT PREP BOOK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                           |                                   | c c d c c                                            |
| A STATE OF THE PARTY OF THE PAR | 407                       | By AZHAR I                        | QBAL 0336-7098894                                    |

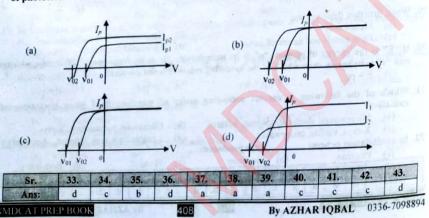
- 33. Lights of two different frequencies whose photons have energies 1 eV and 2.5 eV respectively, successively illuminate a metal of work function 0.5 eV. The ratio of maximum speeds of the emitted electrons will be:

- 34. What energy (in joules) would a photon of light with a wave length 3 x  $10^{-4}$  cm have:
- (b) 3.3 x 10⁻²¹
- (c)  $6.6 \times 10^{-20}$
- (d) 6.6 x 10⁻⁴⁸
- 35. Which of the following is dependent on the frequency of incident radiation in a photoelectric experiment?
  - (a) Amount of photoelectric current
  - Stopping potential to reduce the photoelectric current to zero
  - Work function of the metal used in the experiment
  - (d) Threshold wavelength
- 36. In Compton's effect if f is frequency of incident photon and f' is frequency of scattered photon, then which of the following is true?
  - (a) f = f
- (b)  $f \ge f$
- (c)  $f' \leq f$  (d) f' < f
- 37. A photocell is based on the principle of:
  - (a) Photoelectric effect (c) Compton' effect

- (b) Pair production
- (d) Annihilation of matter
- 38. The work function of tungsten is 4.5 eV. The threshold frequency is:
  - (b) 0.91x10¹⁵ Hz (a)  $1.09 \times 10^{15} \text{ Hz}$
- (c) 1.09x10⁻¹⁵ Hz
- (d) 1x10¹⁶ Hz
- 39. What is the energy of photon in a beam of infrared radiation of wavelength 1240 nm?
- (c) 4 eV
  - (b) 3 eV
- 40. A beam of red light, a beam of yellow light, a beam of green light and a beam of blue light have exactly the same energy. Which beam contains the greatest number of photons and which beam contains the smallest number of photons? (d) Yellow, red (c) Red, blue
- (b) Blue, yellow

- 41. If 'm' is the mass, 'c' is the velocity of light and  $x = mc^2$ , then dimensions of 'x' will be: (d) [MLT⁻²] (c)  $[ML^2T^2]$ (b) [MLT⁻¹]
- (a) [LT⁻¹]

- 42. Which of the following has greatest energy content?
  - (a) 10 photons of yellow light
- 10 photons of blue light
- (d) 10 photons of red light (c) 10 photons of violet light
- 43. Two light beams of same intensities and same energies are incident on two different metals with work functions " $\Phi_2 = 2\Phi_1$ ". Which of the following correctly describes the characteristic curves of photoelectric currents versus applied voltage for given two metals:







(b) 4 eV

- 45. Which of the following graph shows the variation of energy "E" of a photon of light with its frequency "f"?

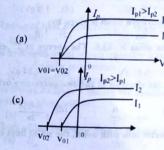


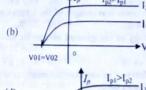
UNIT 11

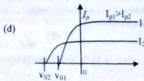




46. Two light beams of intensities "I1" and "I2" such that I1>I2 but both beam have same energies are following correctly describes the characteristic curves of photoelectric current (Ip1, Ip2) versus, applied voltage for the given two metals:







- 47. Plank's constant has same units as that of:
  - (a) Pressure
- (b) Power
- (c) Momentum
- Angular momentum

- 48. Speed of zero rest mass particle in free space is:
  - (a) Zero
- (b) Infinite
- $3 \times 10^8 m/s$
- (d) 332 m/s
- 49. The ratio of energy photon to momentum of photon is equal to: (a) Speed
- 50. Kgm2s-1 is unit of
- (b) Wavelength
  - - (c) Frequency
- (d) None of these

| 1) | Plank's                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (b)              | Rhydberg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (c)               |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
|    | CLINE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | D MINISTER VALUE | A STATE OF THE PARTY OF THE PAR | (-)               |
|    | ALE THE PARTY OF T | 44               | 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | The second second |

| PAR DATE | (0) | Kilyuberg | (c) | Boltzma | nn  | (d) Gen | ieral gas consta |
|----------|-----|-----------|-----|---------|-----|---------|------------------|
| Sr.      | 44. | 45.       | 46. | 47.     | 48. | 1 49    | 50.              |
| Ans:     | b   | d         | a   | d       | c   | 9       | 3                |
| AT DDL.  |     |           |     | u       | C   | a       | a                |

**UNIT 12 >>** 

# ATOMIC SPECTRA

## PRACTICE TEST NO. 1

|     | The ratio of minimum t                                                                  | to maxi   | mum waveleng                | th in Baln   | ner series is:    |           |                          |
|-----|-----------------------------------------------------------------------------------------|-----------|-----------------------------|--------------|-------------------|-----------|--------------------------|
|     |                                                                                         |           |                             |              |                   | (d)       | 3:34                     |
| ,   | (a) 5:9 Which of the following                                                          | phenon    | iena suggests t             | he present   | e of electron er  | ergy lev  | els in atoms:            |
| ۷.  | (a) Radio active de                                                                     | cay       |                             | (0)          | 13010 000         |           |                          |
|     |                                                                                         |           |                             | (d)          | α-particle scat   | tering    |                          |
| 1   | The energy of electron                                                                  | in first  | excited state of            | H-atom is    | -3.4 eV its kin   | etic ener | gy is:                   |
|     |                                                                                         |           |                             |              |                   |           |                          |
| 4   | (a) -3.4 ev<br>In Bohr's model, the at                                                  | omic ra   | dius of the firs            | t orbit is r | , then the rath   | us of the | third orbit is:          |
| 7   | ro                                                                                      | (b)       | r.                          | (c)          | 910               | (u)       | 210                      |
|     | $\begin{array}{c} \text{(a)}  \overline{9} \\ \text{The ionization energy} \end{array}$ | of hy     | drogen atom                 | is 13.6 e    | . Following I     | Bohr's t  | heory, the energy        |
| 5.  |                                                                                         |           |                             |              |                   |           |                          |
|     |                                                                                         | 12        | 1 51 01/                    | (C)          | UADEV             | (d)       | 0.66 eV                  |
|     | (a) 3.40 eV<br>The minimum energy r                                                     | ognired   | to excite a hyo             | rogen ato    | m from its 1st e: | cited st  | ate is:                  |
| 5.  | The minimum energy i                                                                    | (b)       | -13.6 ev                    | (c)          | 3.4 Ev            | (d)       | 10.2 eV                  |
|     |                                                                                         |           | toon in a arbit             | ie given h   | v.                |           |                          |
|     | (a) nh                                                                                  | n or elec | h                           | (0)          | h h               | (d)       | $n^2 \frac{h}{}$         |
|     | (a) nh                                                                                  | (b)       | 2                           | (0)          | 2π                | amittad   | 2π<br>I photon will have |
| 3.  | (a) nh<br>When electron jumps i                                                         | from th   | e first excited             | sate to gr   | ound state, the   | emitted   | photon will have         |
|     | and the second second                                                                   |           |                             |              |                   |           | 1.9 eV                   |
|     | (a) 3.4 eV                                                                              | (b)       | 10.2 eV                     | (c)          | 13.6 eV           |           |                          |
| ).  | (a) 3.4 eV<br>The minimum waveleng                                                      | gth of th | e Lyman serie               | s for the h  | ydrogen atom i    | (d)       | 1/R _H         |
|     | (a) 4/R _H                                                                    | (b)       | 16/R _H           | (c)          | 9/R _H  | The en    | ergy of 2nd excited      |
| 10. | (a) 4/R _H<br>The energy of the grou                                          | nd elec   | tronic state of             | hydgroger    | 1 atom 18 -13.0.  | The chi   | 16,                      |
|     |                                                                                         |           |                             |              |                   |           | - 0.54 eV                |
|     | state is:<br>(a) -3.40 eV                                                               | (b)       | -1.51 eV                    | (C)          | -0.85 eV          | a two si  | accessive orbits of      |
| 11. | . The difference in angul                                                               | ar mon    | ientum associa              | ted with ti  | ie electron in ti | ie ino si |                          |
|     | the hydrogen atom is:                                                                   |           |                             |              |                   |           |                          |
|     | (a) <u>h</u>                                                                            | (b)       | 77                          | (c)          | $\frac{h}{2}$ .   | (0)       | 2π                       |
|     | . When electron in hydro                                                                |           |                             | higher orl   | it into fifth orl | it, the s | et of lines emitted      |
| 12  | . When electron in hydro                                                                | gen ato   | m jumps from                | migner or    | M Into Inta on    |           |                          |
|     | is called:                                                                              | 4.        | DC I series                 | (0)          | Ralmer series     | (d)       | Paschen series           |
|     | (a) Lyman series                                                                        | (b)       | Prund series                | (c)          | painer series     | 100       | and a feet in            |
| 13  | 3. The Balmer series were                                                               | identifi  | ed in the spectr            | um of nyu    | Max planks        | (d)       | J.J. Balmer              |
|     | (a) Einstein                                                                            | (b)       | Compton                     | hudrogen     | atom is relati    | ed to pr  | incipal quantum          |
| 14  | 1. The speed of electron                                                                |           |                             |              |                   |           |                          |
|     | number n as:                                                                            | (6)       | Land 1 man                  | 10 (6)       | v «n              | (d)       | v x 1                    |
|     | (a) $V_n \propto \frac{1}{n}$                                                           | (b)       | $V_n \propto \frac{1}{n^2}$ | (c)          | $v_n \propto n$   | (0)       | $v_n \sim \frac{1}{n^3}$ |
|     |                                                                                         |           |                             |              |                   |           |                          |
|     |                                                                                         |           |                             |              |                   |           |                          |

|   |      |    |    |    |    |    | 1  |    |    |    | 3/1 |     |     | 1 1 1 1        |
|---|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|----------------|
| 1 | Sr.  | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. 14.        |
| ł | A    |    | -  | L  |    | 4  | 1  | b  | h  | d  | Ь   | b   | b   | 13. 14.<br>d a |
| ı | Ans: | a  | C  | D  | C  | a  | a  | D  | D  | a  | U   | U   |     |                |

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| 5. The | sh   | ortest | wavelength    | of spec | tral line | in Balmer of Hydrogen atom is: |
|--------|------|--------|---------------|---------|-----------|--------------------------------|
| (      | a)   | $R_H$  |               | (b)     | $1/R_H$   | (c) 0                          |
| If r.  | is I | the ra | dius of first | quanti  | zed orbit | of hydrogen atom at            |

itom, then radius of 4th quantized orbit is: 17. Which series of spectral lines in hydrogen spectrum does not lie in the infra-red region?

ATOMIC SPECTRA

(b) Paschen series (c) Balmer series (a) Pfund series (d) Brackett series 18. To find longest wavelength in Paschen series of hydrogen spectrum, the value of n is taken equal

to:

19. Which of these series of hydrogen spectrum lies in the ultra-violet region?

(a) Paschen series (b) Pfund series (c) Brackett series (d) Lyman series

20. The ratio of energies of first two excited states of hydrogen atom is:

21. The velocity of electron in the second orbit of hydrogen atom is v. The velocity of electron in fifth orbit will be:

(a) V

22. Highest frequency of Balmer series of hydrogen atom in terms of Rydberg constant Ru and velocity of light c is:

(a) R_HC (c) 4R_Hc

23. When hydrogen atom is in first excited exerted state; It's radius is how many times of its ground state radius? (a) Half (b) Twice

(c) Four times (d) Same as that of ground state 24. The ratio of shortest to longest wavelength of Lyman series is approximately:

25. Radius of first Bohr orbit is r. What is the radius of 2nd Bohr orbit?

(a) 8r (b) 2r (c) 4r (d)  $2\sqrt{2}r$ 

26. In hydrogen atom which quantity is integral multiple of  $h/2\pi$ :

(a) Angular momentum (b) Angular velocity (c) Angular acceleration (d) Momentum

27. According to Bohr's theory the moment of momentum of an electron revolving in second orbit of hydrogen atom will be:

(a) 2 = h(b) πh (d) 2h/π

28. Which of the following line of Balmer series has longest wavelength?

(a)  $H_{\alpha}$ (b) H_B (c) H,

same value 29. Hydrogen atom can give spectral lines in the series named as Lyman, Pfund, Bracket, Balmer

and Paschen. Which of the following is correctt?

(a) Paschen series is in visible region (b) Pfund series is in ultraviolet region (c) Brackett series is in infrared region

(d) Balmer series is in X-ray region 30. The shortest wavelength of radiation in Paschen series is:

(a) R_H/9

(b) R_H (c) 9/R_H (d) 9 + R_H

| CONTRACTOR OF THE PARTY OF THE | -   |     | 15  | 178 | - LIPP |     |     |     |     |     |     |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|--------|-----|-----|-----|-----|-----|-----|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| Sr. 15.<br>Ans: d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 16. | 17. | 18. | 19. | 20.    | 21. | 22. | 23. | 24. | 25. | 26. | 27.       | 28.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 29. | 30. |
| Ans: d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | h   | 0   |     | 1   |        | -   |     |     | -   |     |     | in things | State of the last |     | 001 |
| The second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | U   | C   | c   | d   | d      | d   | d   | c   | d   | C   | a   | C         | c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | C   | C   |

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(d) All have the

|                                                                                                           | CDECTI                  | PΔ      |                              |        | Zayan Publishei       |
|-----------------------------------------------------------------------------------------------------------|-------------------------|---------|------------------------------|--------|-----------------------|
| UNIT 12  31. In the main postulates of Bohr at                                                            | TOMIC SPECTI            | - maul  | ar momentum of ele           | cron   | in hydrogen atom      |
| 31 In the main postulates of Bohr at                                                                      | omic theory, the        | angui   |                              |        |                       |
| is given by the relationship:                                                                             | . nh                    | (c)     | Ze ²              | (d)    | mvr = hve             |
| (a) $\frac{\lambda}{\lambda}$ (b)                                                                         | $mvr = \frac{nn}{2\pi}$ | (0)     | $mVr = \frac{1}{4\pi E, mv}$ |        |                       |
| 31. In the main postulates of Bohr at is given by the relationship:  (a) $mvr = \frac{\lambda}{2\pi}$ (b) | Z.A                     |         |                              |        |                       |
|                                                                                                           |                         |         |                              |        |                       |
| 32. Which of the following has longe                                                                      | Ultraviolet light       | (c)     | Visible                      | (d)    | Infrared              |
| (-) V rays (0)                                                                                            | Citiationer             |         | Markey                       |        | radiations            |
| 33. The ionization energy of hydrog                                                                       | an atom is 13.6         | eV. T   | he energy required           | to re  | emove an electro      |
| 33. The ionization energy of hydrog                                                                       | en atom is roto         |         |                              | 10.0   | Settle de ave P.      |
| from 2" orbit is:                                                                                         |                         | (c)     | 9.5 eV                       | (d)    | 1.5 eV                |
| (a) 13.6 eV (b)                                                                                           | 3.4 eV                  |         |                              |        | Bert Tree             |
| (a) 13.6 eV<br>34. The angular momentum of electr                                                         | on in number of         | (c)     | nh                           | (d)    | n ³ h      |
| (a) nh (b)                                                                                                | nh nh                   | (0)     | $\frac{nh}{2\pi}$            | c bia  | 2π<br>bost frequency? |
| a. S. Haming transition                                                                                   | in the hydrogen         |         |                              | nig    | n = 5 to $n = 2$      |
| (a) nh (b)                                                                                                | n = 3 to $n = 2$        | (c)     | n = 4 to $n = 3$             | (a)    | n - 3 to n - 2        |
|                                                                                                           |                         |         |                              |        |                       |
| 36. Number of spectral lines in hydr                                                                      | 6                       | (c)     | 15                           | (d)    | Infinite              |
| (a) 3 (b)                                                                                                 | was proposed by         | :       |                              |        | Water Street          |
| (a) 3<br>37. The concept of stationary orbits                                                             | Buther ford             | (c)     | J.J thomsan                  | (d)    | Newton                |
| (a) Neil Boher (b)  88. The energy of electron in first ex                                                | eited state of H-8      | tom is  | -3.4 eV its kinetic          | energ  | gy is:                |
| 38. The energy of electron in first ex                                                                    | -6.8 eV                 | (c)     | 3.4 eV                       | (d)    | 6.8 eV                |
|                                                                                                           |                         |         |                              |        |                       |
| (a) -3.4 eV (b)  9. The radius of hydrogen atom in is found to have a radius of 21.2                      | its ground state        | is the  | principal quantum            | nur    | nber n of the fin     |
| is found to have a radius of 21.2                                                                         | × 10 m. what            | is the  | principal i                  |        |                       |
| state of atom:                                                                                            |                         |         |                              | (d)    | n=16                  |
| (a) n=4 (b)                                                                                               | n=2                     | (0)     | V Following Boh              | r's t  | heory, the energ      |
| (a) n=4 (b)  The ionization energy of hydronization has a transition between                              | ogen atom is I          | 3.6 e   | to orbit:                    | -      |                       |
| corresponding to a transition be                                                                          |                         | d infin | ite orbit.                   | (d)    | 0.66 eV               |
| (a) 3.40 eV (b)                                                                                           | 0.85 eV                 | (c)     | 1.51 eV                      | nome   | ntum:                 |
| (a) 3.40 eV (b)  1. In the lowest energy level of hydrogeneous control (c)                                | rogen atom, the         | electro | n has the angular i          | noine. | 2h                    |
| (a) $\frac{\pi}{2}$ (b)                                                                                   | h col                   | (c)     | 2-                           | (d)    | $\frac{2h}{\pi}$      |
| (a) $\frac{1}{h}$                                                                                         | π . Ludrogen            | atom (  | mits photon of the           | lowe   | st frequency:         |
| (a) $\frac{\pi}{h}$ (b)<br>2. Which of the following transition                                           | is in a nydrogen        | (0)     | n=2 to n=1                   | (d)    | n=6 to n=2            |
| (a) n=1 to n=2 (b)  3. An electron in the n=1 orbit of h                                                  | n=2 to n=6              | (0)     | d by 13 6 eV If a l          | vdro   | ogen atom is in t     |
| 3 An electron in the n=1 orbit of h                                                                       | ydrogen atom is         | boun    | d by 13.0 CV. 11 d           |        | ava                   |
| n=3 state, how much energy is it                                                                          | quired to rome          |         |                              | (d)    | 1.51 eV               |
|                                                                                                           |                         |         | 3.4 eV                       | (u)    |                       |
| (a) 13.6 eV 4. In Bohr model of the hydrogen a                                                            | tom, the lowest o       | rbit c  | orresponds to:               |        | With Edition          |
|                                                                                                           | Maximum                 | (0)     | Minimum energy               | (d)    | zero                  |
| (h)                                                                                                       |                         |         |                              | 1      |                       |
| (a) Infinite energy (b)                                                                                   | tion from third         | excite  | d state to first exci        | ted st | tate. The energy      |

the photon emitted is: (c) 2.55 eV (b) 12.09 eV

46. The radius of electron' second stationary orbit in Bohr's atom is R. the radius of the third orbit

| 20 20 20 20 | 24 25 | 26 27          | 29 30 | 40 41.         | 42. 43. | 44. 45. |
|-------------|-------|----------------|-------|----------------|---------|---------|
| (a) 3 R     | (b)   | $\frac{9R}{4}$ | (c)   | $\frac{4R}{R}$ | (d)     | 3       |
|             |       |                |       |                |         |         |

| -  |             | The second | MANAGEM N | Department of the last of the |     |     | 21  | 22  | 20  | 20  | 40  | 41. | 42.       | 43. | 44. | 45. | 46. |
|----|-------------|------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----------|-----|-----|-----|-----|
| 10 | Sr.<br>Ans: | 31.        | 32.       | 33.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 34. | 35. | 36. | 3/. | 38. | 39. | 40. |     | STATE AND | 4   | 0   | h   | b   |
| E  | Ans:        | b          | d         | b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | c   | a   | d   | a   | C   | b   | a   | C   | d         | d   | C   | 0   |     |

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| UNIT 12 | ATOMIC SPECTRA |
|---------|----------------|
|---------|----------------|

47. Hydrogen atom in the ground state are excited by monochromatic radiation of photos 12.1 eV. The spectral lines emitted by hydrogen atom according to Bohr's theory will be: (a) 1 (c) 3

(a) 4 48. The energy required to knock out the electron in the third orbit of a hydrogen atom is equal to:

(a) 13.6 eV (d)  $\frac{3}{16.6}$ eV

49. The size of an atom is:

(a) 10⁻⁸ m

(d) 10⁻¹⁴ m

50. In the n orbit, the energy of an electron  $E_n = -\frac{13.6}{n^2}$  eV for hydrogen atom. The energy required to take the electron form the first orbit to second orbit will be:

(a) 10.2 eV

(b) 12.1 eV

(c) 3.4 eV

(d) 13.6 ev

| Sr   | 47. | 48. | 49. | 50. |
|------|-----|-----|-----|-----|
| Ans: | c   | b   | c   | a   |

### PRACTICE TEST NO. 2

| 1. | In the Bohr's hy | drogen | atomic | model, | the | radius | of th | ne stationary | orbit is | directly | proportiona |
|----|------------------|--------|--------|--------|-----|--------|-------|---------------|----------|----------|-------------|
|    | to:              |        |        |        |     |        |       |               |          |          |             |

(b) n⁻²

(d) n²

2. The lyman series of hydrogen spectrum lies in the region of:

(a) Infrared (b) Visible

(c) Ultraviolet (d) Of X-rays

3. Which one of the series of hydrogen spectrum is in the visible region:

(a) Lyman series (b) Balmer series

(c) Bracket series (d) Paschen series

4. The energy required to remove an electron in a hydrogen atom from n=10 state is:

(a) 13.6 ev

(b) 0.136 eV

(c) 1.36 eV

5. The ratio of the energies of the hydrogen atom in its first to second orbit of hydrogen atom is:

(b)  $\frac{1}{4}$  (c)  $\frac{9}{4}$ 

6. In any Bohr Orbit of the hydrogen atom, the ratio of Kinetic energy to potential energy of the electron is:

(a) 2

7. When a hydrogen atom is raised from the ground state to excited state:

(a) P.E increase and K.E decrease

(b) P.E decrease and K.E increase

(c) P.E increase and K.E increase

(d) P.E decrease and K.E decrease

8. The ratio of kinetic energy to the total energy of electron in Bohr orbit is:

(a) -1:1

(b) 1:2

(c) -2:1

9. The ratio of the long wavelength limits of Lyman and Balmer series of hydrogen spectrum is:

(b) 5:27

(c) 4:1

(d) 1:4

10. Which of the transitions in hydrogen atom emits a photon of lowest frequency? (b) n=4 to n=3

(a) n=2 to n=1

(c) n=3 to n=1(d) n=4 to n=211. According to Bohrs theory the moment of momentum of an electron revolving in 3rd orbit of hydrogen atom will be:

(a)  $2\pi h$ 

| Sr.  | 1 | 2, | 3, | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. |
|------|---|----|----|----|----|----|----|----|----|-----|-----|
| Ans: | d | c  | b  | b  | a  | c  | a  | a  | b  | b   | ь   |

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|-------------|--------------------------------------------------------------------|---------------------|--------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UNIT 12     | en atoms are exc                                                   | and from            | ground state             | to the   | principal quant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ım nu            | mber 4. Then the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 12. Hydrog  | gen atoms are exc                                                  | bearred w           | ill be:                  |          | and bearing to the March                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| number      | r of spectral lines                                                | (b) 5               | in bei                   | (c)      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (d)              | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (a)         | 3<br>nydrogen atom is i                                            | ite firet e         | veited level, it         | radi     | us is its groun                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | d state          | radius:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 13. When h  | nydrogen atom is i                                                 | (b) Tw              | ice                      | (c)      | Same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (d)              | 4 times                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (a)         | Half                                                               | bit of H-a          | tom is always:           | 1        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 14. Energy  | of electron in a or                                                |                     |                          |          | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (d)              | Nothing can be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (a)         | Positive                                                           | (b) Ne              | gative                   | (c)      | Zero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (4)              | said                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|             | reme wavelength                                                    | of naschen          | series are:              |          | THE PERSON NAMED IN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 10 78            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 15. The ext | $0.365  \mu \text{m}$ and $0.5$                                    | 65 µm               |                          | (b)      | 0.818 µm and 1.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | $7 \mu \text{m}$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a)         | 1.45 µm and 4.04                                                   | um                  |                          | (4)      | 2 27 um and 7 43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | um               | 1881 - ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (c)         | 1.45 µm and 4.04<br>drogen atom, wh                                | ich of the          | following elec           | tronic   | transitions would                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | d invo           | lve the maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 16. In a hy | drogen atom, wa                                                    | ch or the           |                          |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| energy      | change?<br>From n = 2 to n =                                       | 1                   |                          | (b)      | From $n = 3$ to $n =$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | - 2              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a)         | From $n = 2$ to $n =$                                              | 2                   |                          | (d)      | From $n = 3$ to $n =$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | = 2              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c)         | the electron in th                                                 | hvdroge             | n atom jumps             | from     | 2nd orbit to 1"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | orbit,           | the wavelength of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 17. When    | From $n = 4$ to $n =$ the electron in the radiation is $\lambda$ . | When an             | electron jump            | s fron   | 3 rd orbit to 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | orbit            | the wavelength o                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| emitted     | radiation is:                                                      |                     |                          |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 74)              | 13 .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (0)         | 27 .                                                               | (b) $\frac{32}{27}$ | 2                        | (c)      | $\frac{25}{13}\lambda$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (d)              | 25 X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| (a)         | 32 1                                                               | 27                  | atom in                  | first to | second excited s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | tate is:         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 18. The rat | $\frac{32}{32}$ to of the energies                                 | of the hya          | rogen atom in            | (c)      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (d)              | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| (a)         | 4                                                                  | (b) $\frac{9}{4}$   |                          | (0)      | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 10 Accord   | ing to Bohr's atom                                                 | nic model:          |                          |          | agreed of other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|             |                                                                    |                     |                          | leus     | fax an                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (h)         | TT I saturan radio                                                 | te energy (         | only when it jui         | iips co  | inner orbit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c)         | The electron can                                                   | move only           | in particular or         |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | SIN STATE OF THE S |
| (d)         | Both B and C                                                       |                     |                          |          | 2 to the second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | orbit 1          | = 2, the spectral                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 20. When    | Both B and C<br>an electron drop                                   | from any            | higher orbit i.          | e. n ≥   | 3 to the second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | 1 2 0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| lines no    | roduced fall in the                                                | region:             |                          | 38.67    | title state                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d)              | X-rays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (a)         | Visible                                                            | (b) Inf             | rared                    | (c)      | The orbital at                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | oular            | momentum of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 21. A hydr  | Visible<br>ogen atom in grou                                       | nd sate ab          | sorbs 10.2eV             | or ene   | gy. The orbital a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| electro     | n is increased by:                                                 |                     |                          |          | 2 11 10-34 Ic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (d)              | 4 22 x 10 Js                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (a)         | 1.05 x 10 ⁻³⁴ Js                                        | (b) 3.1             | 6 x 10 ⁻³⁴ Js | (c)      | state and all the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | possib           | le excited state of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 22. Which   | 1.05 x 10 ⁻³⁴ Js<br>of the following of                 | orrectly r          | epresents the            | owesi    | state and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Bracke      | t series of the nya                                                | rogen ator          | n?                       | (h)      | $n = 2$ , $n = 3$ to $\infty$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| · (a)       | $n = 1$ , $n = 2$ to $\infty$                                      |                     |                          | (d)      | $n = 4$ , $n = 5$ to $\infty$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c)         | $n = 3$ , $n = 4$ to $\infty$                                      | Value 7             |                          | (0)      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 23. The ly  | man transition inv                                                 | olve:               | on the last              | (b)      | Smallest change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | of poter         | ntial energy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (a)         | smallest change                                                    | of kinetic el       | nergy                    |          | I st abange of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | f total e        | nergy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| (c)         | Smallest change                                                    | of total ene        | rgy                      | ctral I  | ines in going from                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lyma             | an series to Pfund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 24. Which   | Smallest change<br>of the following i                              | s true for          | number of spec           |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  | and the shelp of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| series?     |                                                                    |                     |                          | (c)      | THE RESERVE OF THE PERSON OF T | (d).             | May decreases or                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| (a)         | Increase                                                           | (b) De              | creases                  | (0)      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Total Co         | increases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|             |                                                                    |                     |                          |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|             |                                                                    |                     |                          |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|             |                                                                    |                     |                          |          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|   | Sr.  |     |     | and the second | To the same of |     | 1   | 10  | 10  | 20  | 21          | 22. | 23. | 24. |
|---|------|-----|-----|----------------|----------------|-----|-----|-----|-----|-----|-------------|-----|-----|-----|
| H | Sr.  | 12. | 13. | 14.            | 15.            | 16. | 17. | 18. | 19. | 20. | THE RESERVE | d   | d   | ь   |
|   | Ans: | d   | d   | b              | b              | a   | a   | b   | d   | a   | a           | d   | 0   |     |

| Ans: d        | d    | b | b | a | a   | b | d a     | a d    |              |
|---------------|------|---|---|---|-----|---|---------|--------|--------------|
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ATOMIC SPECTRA 25. The de-Broglie wavelength of an electron in the first Bohr orbit is: (a) Equal to one fourth the circumference of the first orbit (b) Equal to half the circumference of the first orbit (c) Equal to twice the circumference of the first orbit (d) Equal to the circumference of the first orbit 26. Molybdenum is used as target element for production of x-rays because it is: (a) A heavy element and can easily absorb high velocity electrons (b) A heavy element with a high melting point (c) An element having high thermal conductivity (d) Heavy and can easily deflect electrons 27. The electron is in 2nd excited state in hydrogen atom. Number of spectral lines emitted will be: (a) 2 (b) 4 28. The total energy of electron in the first excited state of hydrogen atom is -3.4 eV, The potential energy of electron in this state is: (a) -3.4 eV (c) -6.8 eV (d) 6.8 eV 29. Lyman series of hydrogen atom lies in: (a) Visible region (b) Infrared (c) U.V region (d) None of these 30. When an electron makes a transition from 4th energy level to 2nd energy level in hydrogen atom then the wavelength of emitted radiation would be: 31. Hellium was first identified in the using spectroscopy: (a) Earth (b) Jupiter (c) Sun (d) Stars 32. If L is angular momentum of electron in the 2nd orbit of hydrogen atom then angular momentum in the fourth orbit will be: (a) 2 L (b) 3 L 33. Atomic spectrum of hydrogen is: (a) Continuous spectrum (b) Band spectrum (c) Line spectrum (d) None of these 34. Electron revolving around the nucleus behaves as a: (a) Transverse wave (b) -wave (c) Longitudinal wave (d) Stationary wave 35. K.E of electron in the nth orbit of hydrogen atom is: (a)  $Ke/2r_n$ (b) Ke/r_n (c)  $Ke^2/r_n$ 36. The longest wavelength of spectral line for Balmer series is: (a) 36R_H/5 (b) 36 R_H (c) 36/5 R_H (d) None of these 37. The red line of the Balmer series corresponds to transition between energy levels having quantum numbers: (a) 4 and 2 (b) 3 and 2 (d) ∝ and 2 (c) 5 and 2 38. The value of Rydberg's constant "RH" is: (a)  $1.0974 \times 10^{-7} \text{ m}^{-1}$  (b)  $1.0974 \times 10^{7} \text{ m}^{-1}$ (c)  $1.0974 \times 10^{-7}$  m 39. The energies required in electron volt to remove an electron from three lowest excited states of hydrogen atom are: (a) 13.6, 3.4, 1.5 (b) 13.6, 10.2, 3.4 (c) 13.6, 6.8, 3.7 40. As the quantum number increases, the energy difference between consecutive energy levels of an atom: (a) Increases (b) Decreases (c) Remains same (d) Becomes infinite

| Sr. 25.<br>Ans: d | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33. | 34. | 35. | 36. | 37. | 38. | 39. | 40. |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aus: d            | b   | c   | c   | c   | d   | c   | a   | c   | d   | d   | c   | ь   | ь   | a   | ь   |

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UNIT 12

# 41. According to Bohr's Model of Hydrogen atom:

- (a) The linear velocity of electrons is quantized
- (b) The total-linear momentum of electrons is quantized
- (c) The angular momentum of electrons is quantized
- (d) All of these

## 42. The energy of an electron:

- (a) Is greater in outer orbit than in inner orbits
- (b) Is always the same whichever the orbit may be
- (c) Decreases as the quantum number increase
- (d) Is greater in inner orbits than in outer orbits

### 43. Which of the following is true?

- (a) Lyman series is a continuous spectrum
- (b) Paschen series is a line spectrum in the infrared
- (c) Both 'a' and 'b'
- None of these (d)
- 44. A hydrogen atom (ionization potential 13.6 eV) makes a transition from third excited state to first excited state. The energy of photon emitted in the process is:
  - (a) 1.89 eV
- (b) 2.55 eV
- (c) 12.09 eV
- (d) 12.75 eV

### 45. To explain his theory, Bohr used:

- (a) Conservation of linear momentum
- (b) Conservation of angular momentum
- (c) Conservation of quantum frequency
- (d) Conservation of energy
- 46. Hydrogen atoms are excited from ground state to the principal quantum number 5. Then the number of spectral lines observed will be:
- (b) 6

- 47. Minimum excitation potential of Bohr's first orbit in hydrogen atom is:
  - (a) 13.6 eV
- (b) 3.4 V
- (c) 10.2 V
- (d) 3.6 v
- 48. The energy required to excite an electron from the ground state of hydrogen atom to the first (a)  $1.602 \times 10^{-14} \text{ J}$  (b)  $1.619 \times 10^{-16} \text{ J}$  (c)  $1.632 \times 10^{-18} \text{ J}$  (d)  $1.656 \times 10^{-20} \text{ J}$ excited state, is:

- 49. The ratio of longest to shortest wavelength in Brackett series of hydrogen spectra is:
  - (a)
- (c)
- 50. The energy of hydrogen atom in its ground state is -13.6 eV. The energy of the level corresponding to the quantum number n is equal 5 is:
  - (a) -5.40 eV
- (b) -2.72 eV
- (c) -0.85 eV
- (d) -0.54 eV
- 51. Radius of the first orbit of the electron in a hydrogen atom in 0.53 Å. So, the radius of the third orbit will be:
  - (a) 2.12Å
- (b) 4.77Å
- (c) 1.06Å
- (d) 1.59Å
- 52. Energy of an electron in an excited hydrogen atom is -3.4 eV. Its angular momentum will be: (a)  $1.11 \times 10^{34} \text{ J sec}$  (b)  $1.51 \times 10^{-31} \text{ J sec}$  (c)  $2.11 \times 10^{-34} \text{ J sec}$  (d)  $3.72 \times 10^{-34} \text{ J sec}$
- 53. The wavelength of light emitted from second orbit to first orbit in a hydrogen atom is:
- (a) 1.215x10⁻⁷ m
- (b) 1.215x10⁻⁵ m
- (c) 1.215x10⁻⁴ m
- (d) 1.215x10⁻³ m

| Sr.  | 41. | 42. | 43. | 44. | 45. | 46. | 47. | 48. | 49. | 50. | 51. | 52. | 53. |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ans: | d   | a   | b   | b   | d   | b   | c   | c   | a   | d   | b   | c   | a   |

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ATOMIC SPECTRA

(c) 12.09 eV

(d) 1.51 eV

- 56. Energy E of a hydrogen atom with principal quantum number n is given by  $E = \frac{-13.6}{r^2}$  eV. The energy of a photon ejected when the electron jumps from n = 3 state to n = 2 state of hydrogen is approximately:
  - (a) 1.5 eV
- (b) 0.85 eV (c) 3.4 eV
- (d) 19eV

57. The Bohr model of atoms:

(a) 13.6 eV

(a) Assumes that the angular momentum of electrons is quantized

54. Energy of the electron in n orbit of hydrogen atom is given by En

energy added to transfer electrons from first orbit to third orbit is:

(b) 3.4 eV

- (b) Uses Einstein's photo-electric equation
- (c) Predicts continuous emission spectra for atoms

55. In nth shell of hydrogen atom velocity of electron is

- (d) Predicts the same emission spectra for all types of atoms
- 58. The kinetic energy of an electron revolving around a nucleus will be:
  - (a) Four times of P.E

(b) Double of P.F.

(c) Equal to P.E

- (d) Half of it P.E.
- 59. The spectrum of perfect black body is:
  - (a) Line

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(b) Band

(c) Continuous

- (d) All of these
- 60. Which source is associated with a line emission spectra:
  - (a) Electric fibre

(a) Continuous

- (b) Red traffic light
- (c) Neon street sign
- (d) Sun (c) Release
- 61. Sun spectra aiso has dark lines in pattern which corresponds to (b) Emission
- (a) Absorption 62. Atomic spectra is a ...... spectra:
  - (b) Discrete
- (c) Both a and b
- (d) None of these

(d) Free particle

- 63. When electron series terminates on 4th orbit ..... series is obtained.
  - (a) Balmer
- (b) Pfund
- (c) Paschen
- (d) Bracket
- 64. The atom is excited to an energy level E, from its ground state energy level E, the wavelength of the radiations emitted is:
- (c)  $\frac{(E_1-E_0)}{hc}$
- 65. If electrons of charge 'e' moving with velocity 'v' are accelerated through a potential difference 'V' and strike a metal target, then velocity of electrons is:

65. 63. 64.

UNIT 13

# **UNIT 13 >>**

# **NUCLEAR PHYSICS**

# PRACTICE TEST NO. 1

| (35) | 1919    |                                    |           |                   |          | - than       | proto    | ne are | called     | :               |          |           |                    |          |
|------|---------|------------------------------------|-----------|-------------------|----------|--------------|----------|--------|------------|-----------------|----------|-----------|--------------------|----------|
| 1.   |         | rticles equa                       |           |                   |          |              |          |        |            |                 | b        | (d)       | None               | of thes  |
|      | (a)     | Mesons                             |           | (b)               | Bary     | ons          | - otnor  | (0)    | ark wi     | Il resi         | alt in t | he cha    | rge of             |          |
| 2.   | The su  | Mesons<br>m of charge              | of one    | top q             | uark a   | and on       | e strai  | (c)    | ē.         |                 |          | (d)       | ī                  |          |
|      | (0)     | d                                  |           | (b)               | и        |              |          | (0)    |            |                 |          | (-)       | 530                |          |
| 3.   | Radiat  | ions bend in                       | opposi    | te dir            | rection  | in ma        | ignetic  | neid   | are:       |                 |          | (d)       | Allre              | diation  |
|      | (a)     |                                    |           | (b)               | y an     | $d\beta$ rac | liation  | (c)    | u and      | Y               |          | (4)       | 2411               | diation  |
|      |         | radiations                         |           |                   |          |              |          |        | radia      | tions           |          |           |                    |          |
| 4.   | The tu  | mors are irr                       | adiated   | by:               |          |              | 41 10    |        | N. A.      |                 |          | (4)       | and the same time. | 100      |
|      |         | α-rays                             |           | (b)               | y-ray    | ys           |          | (c)    | β-ray      | S               |          | (a)       | proto              | n        |
| 5.   | Which   | one is used                        | for trea  | tmen              | t of li  | ver car      | icer?    |        |            |                 |          |           |                    | AND THE  |
| ٥.   |         |                                    |           |                   |          |              |          | (c)    | Coba       | lt-60           |          |           | Na-24              | 4        |
| ,    | A tamia | Nal<br>number of                   | a nucle   | us is             | Z and    | atomi        | c mass   | is M.  | The n      | umbe            | r of ne  | utron     | is:                |          |
| 6.   | Atomic  | number of                          | a nucle   | (b)               | M        |              |          | (c)    | Z          |                 |          | (d)       | M + 2              | _        |
|      | (a)     | M – Z<br>ctron emitte              | ad in he  | to ra             | diatio   | n origi      | nates f  | rom:   |            |                 |          | - October | and the same of    | No.      |
| 7.   |         |                                    | of aton   | ne ia             |          |              | 1 Miles  | (b)    | Free       | electro         | ns exi   | sting in  | n nucle            | 1        |
|      | (a)     | Decay of a                         | s of aton | ina               | nucleu   | ıs           |          | (d)    | Photo      | n esca          | ping f   | rom th    | e nucle            | us       |
|      |         |                                    | neutron   | III a             | liucicu  |              |          |        |            |                 |          |           |                    |          |
| 8.   | Radioa  | ctivity is:                        |           |                   |          |              |          | (b)    | Self d     | isinte          | gration  | proce     | SS                 |          |
|      |         | Irreversible                       |           |                   |          |              |          | (4)    | All of     | the al          | nove     |           |                    |          |
|      | (c)     | Spontaneo                          |           |                   | tal I    | ant in       |          |        | ntaine     | r bets          | -deca    | ys wit    | h half             | -life of |
| 9.   | Ten gr  | Spontaneou<br>ams of radi          | oactive   | mate              | eriai s  | the the      | ontain   | er aft | er 540     | days            | will be  | very      | nearly             |          |
|      |         |                                    |           |                   |          |              |          |        |            |                 |          |           |                    |          |
|      | (a)     | 10 g                               |           | (b)               | 5 g      | 2 1          | 4 1      | 6      | . 222      | 0               |          | Licoba    | re ie.             |          |
| 10   | Of the  | following at                       | oms 14    | C, 13             | N, 22    | Ra,          | , N,     | Oar    | 1d 86      | Kn a j          | pair of  | ISOUA     | 13 13.             | NII-     |
| 10.  | OI the  | 10 g<br>following at<br>13 N, 14 N | 6         | (h)               | 14       | 14.          | ,        | (c)    | 140        | 13 _N |          | (d)       | 14 _C    | 160      |
|      | (a)     | 13 _N , 14 _N  |           | (D)               | C.       | 7 N          |          | (-)    | 6          | 7               |          |           | 6                  | 6        |
|      |         | 7 N, 7 N<br>active samp            | La mith   | a hal             | f life o | f I me       | onth ha  | s acti | vity 2     | uCi. V          | Vhich    | of the    | follow             | ing wa   |
| 11.  | A radio | active samp                        | ne with   | 9                 |          |              | 700      |        |            |                 |          |           |                    |          |
|      |         | two months                         | s earner  | 4                 | (        |              |          | (c)    | 8 μCi      |                 |          | (d)       | 10 µC              | i        |
|      | (a)     | 4 μCi                              |           | 1-1               | 6 μCi    |              |          | (0)    |            |                 |          |           |                    |          |
| 12.  | During  | a positive b                       | eta deca  | y;                |          |              | is signt | ed fro | m nucle    | eus             |          |           |                    |          |
|      | (a)     | A positron                         | already p | oreser            | nt in ni | ucieus       | is eject | eitron | III IIIICI |                 |          |           |                    |          |
|      | (b)     | A proton in                        | the nucl  | leus d            | lecays   | emittii      | ig a po  | Sition |            |                 |          |           |                    |          |
|      | (c)     | Both A and                         | В         |                   |          |              |          | tad in | to an a    | nositr          | on       |           |                    |          |
|      | (d)     |                                    | nding en  | ergy              | of nuc   | leus is      | conver   | tea m  | to an a    | positi          |          |           |                    |          |
| 13.  | The mo  | st stable ele                      | ment is:  |                   |          |              |          |        | PAN.       |                 |          | (d)       | Cobalt             |          |
|      | (a)     | Copper                             |           | (b)               | Urani    | um           |          | (C)    | Iron       |                 |          | (4)       | Coomi              |          |
| 14   | No. of  | Copper and $\beta$ – pa            | rticle en | nitted            | in the   | e react      | ion 90X  | →      | 80 Y:      |                 |          | (4)       | 0 0                |          |
| •    | (a)     | 6.6                                |           | (b)               | 6.8      |              |          | (c)    | 8,6        |                 |          | (d)       | 8,8                |          |
|      | (a)     | 0,0                                |           | . ,               |          |              |          |        |            |                 |          |           |                    |          |
|      |         |                                    |           |                   |          |              |          |        |            |                 |          | 1         | 1.0                | 14.      |
|      | Sr.     | 1. 2.                              | 3.        | 4.                | 5.       | 6.           | 7.       | 8.     | 9.         | 10.             | 11.      | 12.       | 13.                | -        |
|      | SI,     |                                    | 5.        | COLUMN TO SERVICE |          |              |          |        | 0          | 6               | c        | Ь         | C                  | С        |

| Sr.  |       | 2  | 3  | 4         | 5  | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14 |
|------|-------|----|----|-----------|----|----|----|----|----|-----|-----|-----|-----|----|
| Ans: | 10000 | 2. | 3. | Read Pile | 0. | -  |    | 0  | 0  | 1 6 | c   | Ь   | C   | C  |

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| 15. In majority of a radioactive elements the rat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | tio of number of neutrons to that of protons:          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| (a) Decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (b) Increases                                          |
| (c) Remain constant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (d) Sometimes decreases and sometimes increases        |
| 16. Among the radioactivity radiations, which of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ne has greater speed?                                  |
| (a) α-particle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (b) β-particle                                         |
| (c) γ-ray                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (d) All have same speed                                |
| 17. The half life of uranium-238 is while                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | the half life of radium-226 is                         |
| (a) 3.8 days, 23.5 minutes<br>(c) $1620$ years, $4.5 \times 10^9$ years                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (b) 23.5 minutes, 3.8 days                             |
| (c) 1620 years, $4.5 \times 10^9$ years                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (d) $4.5 \times 10^9$ years, 1620 years                |
| value is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | adioactive substance is reduced to half of its initial |
| (a) Mean life (b) Half life                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (a) Complete Co.                                       |
| 19. Different biological effects of radiation can be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c) Complete life (d) Decay life                       |
| (a) Somatic effect (b) Genetic effect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                        |
| 20. For same absorbed dose, α-particles are:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (c) Curie effect (d) Both a and b                      |
| (a) 10 times more damaging than X-rays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (b) 20 times less damaging than X-rays                 |
| (c) 10 times less damaging than A-rays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (d) 20 times more demaning at 1                        |
| 21. The background radiation to which we are exp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | osed, an average is:                                   |
| (a) 2 Sv per year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | (b) 2 Sv per month                                     |
| (c) 2 mSv per month                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (d) 2 - 5                                              |
| 22. To measure pesticide levels, a pesticide can be                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | e identified with a radioisotope such as G             |
| technique):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | a radioisotope, such as (in tracer                     |
| (a) Chlorine-36 (b) Sodium-24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (c) Cobalt-60 (d) lodine-131                           |
| 23. After six half lives, the number of atoms decayed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ed of a radioactive sample will be times initial       |
| The state of the s | times initial                                          |
| (a) $\frac{1}{-}$ (b) $\frac{1}{-}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (c) 63 31                                              |
| 64                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | (6)                                                    |
| 24. A radioactive element X with a half-life of 2 ho<br>of t hours the ratio of X to Y atoms is 1.7. Then                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | una da                                                 |
| a would be 1.7. Then                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | is equal to:                                           |
| (b) Detween 4 and 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (c) 6 (d) 14                                           |
| 25. The radioactivity of an element becomes $\frac{1}{4}$ th o                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | f its original value in 60 seconds. Then the half      |
| value period is.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | NOT I'd to the release of mothers are the sent to      |
| (a) 5 sec (b) 10 sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (c) 20 sec (d) 30 sec                                  |
| 6. For the total number N of a radioactive element, are given by $\Delta N = -\lambda N \Delta t$ . Where $\lambda$ represents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | the number of elements AN decayed in a time At         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | at the Δt decayed in a time Δt                         |
| (a) wavelength of the emitted radiations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (b) Half-life period of the element                    |
| (C) Disintegration constant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d) None of these                                      |
| Which one of the following combination of rac isotope of the original nucleus?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | dioactive decay results in the formation of            |
| isotope of the original nucleus?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | results in the formation of an                         |
| (a) One alpha and four beta                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (b) One alpha and one beta                             |
| (c) One alpha and two beta                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (d) Four alpha and one beta                            |
| For the radiotherapy of a patient, it is required to must be taken:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | to double the absorbed does in any What                |
| (a) Energy must be quested to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | the absorbed dose in gray. What step                   |
| By must be quartered                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | (b) Energy must be halved                              |
| (c) Energy must be raised four times  Carbon-14 releases:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (d) Energy must be doubled                             |
| (a) a radiati                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | and a must be doubled                                  |
| (a) $\alpha$ -radiations (b) $\beta$ -radiations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (c) Neutrons (d) y-rays                                |
| Sr. 15 16 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | (c) Neutrons (d) γ-rays                                |
| ns: h 10. 17. 18. 19. 20. 21. 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2. 23. 24. 25. 26. 27 28 29                            |
| c d b d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 20. 20. 20. 27. 20. 29.                                |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | a c c d c c d b                                        |

| PRACTICE | TEST | NO. 2 | 2 |
|----------|------|-------|---|
|          |      |       |   |

| PRACTICE                                                                        | LIEST NO. 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. When gamma photon is entered in nucleus it                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The state of the s |
| (a) De-excite the Nucleus                                                       | (b) Excite the N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Scatter by atom                                                             | (d) None of thes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | e my man manufacture and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2. A radioactive decay rate of 3.7 x 1010 disinteg                              | rations per second defi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | nes the unit of measuremen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| known as the:  (a) Curie (b) Rutherford                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| a t manus amission of alastran fram                                             | (c) Rontgen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d) Rad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (a) Radioactivity nucleus                                                       | 41                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) A stable nucleus                                                            | (b) Innermost ele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4. Tracers are widely used in:                                                  | (d) Outer most el                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ectron orbit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (a) Medicine to detect malignant tumors                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (b) Agriculture to study up take of fertilizer                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Agriculture to understand photosynthesis                                    | (d) All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| A radioactive element emits 200 particles per                                   | second After three he                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 25                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| are emitted. The half life period of element will                               | he                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | urs 25 particles per second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                                                 | (c) 60 minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (1) 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| LED TV produces radiation.                                                      | (c) oo minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (d) 50 minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| (a) Alpha (b) Beta                                                              | (c) Gamma                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (A) NI C.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Which isotope has highest momentum when more                                    | ving with same velocity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (d) None of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                                                                 | ing with same velocity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Protium (b) Deuterium                                                       | (c) Tritium                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (d) All of these have                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| are used to monitor radiation received h                                        | workers in nuclear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | same momentum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| (a) Wilson cloud chamber                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | acinties:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| (c) Film badge dosimeter                                                        | (d) Scalar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Which of the following particle(s) can cause redn                               | ess and sores on the el                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | in.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (a) α-particles (b) β-particles                                                 | (c) v-particles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (d) Both A and D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| A radioactive nuclide decays by emitting an al                                  | pha particle, a beta r                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | article and a gamma raw                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| photon, the change in the nucleon number will be                                | e:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | article and a gamma ray                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| (a) -4 (b) -1                                                                   | (c) -2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | (d) -3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Examples of somatic effect are:                                                 | (6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (d) -3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (a) Induction of cancer                                                         | (b) Landellain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (c) Drop in white blood cells                                                   | (b) Loss of hair<br>(d) All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Damage to skin cells is included in effect of                                   | (d) All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) Somatic (b) Genetic                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 40. 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                                                                                 | (c) Curie                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (d) Becquerel                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Plutonium decays with a half life of 24000 year fraction of it that remains is: | rs. II plutonium is st                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ored for 72000 years, the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| ( ) 10                                                                          | A Late of the late |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (0) 1/4                                                                         | (c) 7/8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | (d) 1/8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Radioactivity is the phenomenon associated with:                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

(a) Production of radio waves

(b) Reception of radio waves (c) Transmission of radio waves (d) Decay of atomic nucleus

15. According to laws of radioactive disintegration, the rate of decay is:

(a) Same for different elements

(b) Smaller for elements with smaller nuclear mass

(c) Different for different elements

(d) Greater for elements with smaller nuclear mass

| Ans: b | BEADON. | 3000 | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. |
|--------|---------|------|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| 0      | a       | a    | d  | c  | d  | c  | c  | d  | а   | d   | 2   | d   | d   | C   |

UNIT 13

By AZHAR IQBAL 0336-7098894

| UNIT 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | NOOLLAN                                      |            | The beat of            | 1010756    | 1071   |        | Caur     |       | Ni sa  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------------|------------------------|------------|--------|--------|----------|-------|--------|
| 30. 100 rad is equal to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | o) 0.01 Gy                                   | (c)        | 10 Gy                  |            | (d)    | 0.0    | 001 G    | iv    |        |
| (a) 1 Gy (t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.01 Gy                                      | na rac     | listion, ra            | diation    | sickn  | ess is | cau      | sed   | wher   |
| (a)   Gy<br>31. In the effects of exposure to                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | high levels of follia                        | ing rai    |                        | 1-1-1-1    |        |        |          | mig   |        |
| equivalent dose in milli sieve                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | rt is:                                       | (c)        | 1500                   |            | (d)    |        |          | Y     |        |
| (a) 1000 (b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | (0)        | 1500                   |            | (-)    |        |          |       |        |
| 32. Equal doses of difference rad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | iations:                                     | (b)        | Do not p               | roduce s   | ame b  | iolog  | ical e   | ffec  | et     |
| (a) Produce same biologi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | careffect                                    | (d)        | Produce                | same dar   | nage   | to eve | es       |       |        |
| (c) Produce same damage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | to body                                      |            | rioduce                | Julie Con  |        |        |          |       |        |
| 33. Average radiation dose for h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | aving a chest A-ray                          | (c)        | 200 mSv                |            | (d)    | 10     | 00 m     | Sv    |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |            | be actual              | mount      |        |        |          | Ni je |        |
| (a) 30 mSv<br>34. C ¹⁴ has half-life 5700 years. A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | t the end of 11400 y                         | (b)        | 0.5 of or              | oinal am   | ount   |        |          |       |        |
| (a) 0.0625 of original am                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ount                                         |            | 0.125 of               |            |        |        |          |       |        |
| (c) 0.25 of original amou                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | nt                                           |            |                        | or ig      |        |        |          |       |        |
| 35. The number of protons in the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | nucleus is called                            | _ nui      | oborge (               | d) Nei     | ther a | tomic  | nor      | cha   | rge    |
| (a) Atomic (b) (36. A radioactive source has a ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Charge (c) Ato                               | mic of     | Il it take f           | or 7/8 of  | the s  | ource  | e to d   | eca   | v?     |
| 36. A radioactive source has a ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | If-life of 80 s. How is                      | ong wi     | 240s                   | and the Co | (d)    | 64     | 0s       |       |        |
| (a) 10s (t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ) /08                                        | (c)        | 2405                   |            | (-)    |        |          |       |        |
| 37. Wave nature of He atom is si                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | milar to                                     | (-)        | Gamma                  | ave        | (d)    | X-     | rays     |       |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              | (c)        | ocured                 | cont       |        |        |          |       |        |
| (a) Alpha rays (b) 38. The artifacts and fossils are t                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | sed to estimate ages                         | by me      | Radioact               | ive'       | (d)    | All    | of-th    | iese  |        |
| (a) Mineral (b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ) Chemical                                   | (c)        | Radioact               |            | (-)    |        |          |       |        |
| 39. Nuclear force is                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                              | (b)        | Both cha               | ree and s  | pin in | depe   | nden     | t     |        |
| (a) Spin independent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                              | (b)<br>(d) | Charge d               | ependent   | \$0.4T | Her    |          |       |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | arge independent                             | (u)        | Iranium n              | oust hav   | e:     |        |          |       |        |
| 40. One isotope of Uranium is U-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 238. Any other isoto                         | pe or c    | 92 neutro              | ns         | (d)    | 140    | 6 neu    | tron  | IS     |
| (a) 146 protons (b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ) 92 protons                                 | (0)        | voore if th            | e startin  | g am   | ount   | is 32    | mg    | g? the |
| (a) 146 protons (b<br>41. How many milligrams of triti                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | um will remain atte                          | F 49.2     | years ii tii           | W 2 4 4 1  |        |        |          |       |        |
| half-life of tritium is 12.3 year                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | S.                                           | ·(c)       | 1mg                    |            | (d)    | 4m     | g        |       |        |
| (a) 8mg (b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ) 2mg                                        | · (c)      | Ting                   |            | 0      |        |          |       |        |
| 42 Total charge on any nucleus i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | s:                                           | (-)        | Ze                     |            | (d)    | Ne     | bay.     |       |        |
| (a) Ne (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Wq                                           | (c)        | flife (in v            | ears) is   |        |        |          |       |        |
| (a) Ne (b) 43. Mean life of a radioactive eler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | nent is 1 year. Then                         | (a)        | 0.693                  |            | (d)    | 0.5    | N.       |       |        |
| (a) 1.4 (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                                            | (C)        | mass defe              | ct given   | in a.i | m.u is | s:       |       |        |
| (a) 1.4 (b) 44. If the binding energy of the de                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | euterium is 2.23 Me                          | v. The     | 0.0012                 | AVA        | (d)    | 0.0    | 024      |       |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                              |            |                        |            | - 9/7  |        |          |       |        |
| 45 Which ray shows comparable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | penetrating power t                          | o x ray    | Gamma                  |            | (d)    | Rac    | lio w    | ave   | S      |
| (a) Alpha (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Beta                                         | (c)        | Gainina                |            |        |        |          |       |        |
| 46. The H atom has quarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | · 19 . 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | (-)        | 3                      |            | (d)    | 4      |          | e to  |        |
| (h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                                            | (c)        | 3                      |            | - ole  | 200    |          |       |        |
| 47 What will be the product after                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | alpha decay of U-23                          | 38?        | Rn-234                 |            | (d)    | No     | ne of    | thes  | se     |
| (a) Th-234 (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Po-234                                       | (c)        |                        |            | 1      | Ther   |          |       |        |
| (a) Th-234 48. What is the fraction of atom lo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ft after 10 half life o                      | f a sub    | stance:                |            | (d)    | 1/20   | 048      |       |        |
| (a) 1/512 (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1/1024                                       | (c)        | 1/256                  |            | (0)    | 303    |          |       |        |
| 49. Radioactive wastes are of:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                              |            | MATE TO                | 177        | (d)    | Fou    | r type   | es    |        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Five types                                   | (c)        | Three type             | S          | (u)    | 100    | li pel s |       |        |
| (a) Two types (b) 50. SI unit of equivalent dose is:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                              |            |                        |            | (d)    | Ren    | 1 (6)    |       |        |
| (a) Gray (b)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Rad                                          | (c)        | Sievert                |            | (d)    | Kell   |          |       |        |
| (a) Gray                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                              |            | 100 10                 | 44 45      | 46.    | 47.    | 48.      | 19.   | 50.    |
| Sr. 30. 31. 32. 33. 34. 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5. 36. 37. 38. 39.                           | 40. 41     | 42. 43.                | 44. 45.    | -      |        |          | ь     | c .    |
| PRODUCTOR OF THE PRODUC |                                              | bb         | c c                    | d c        | C      | a      | -        |       |        |
| Ans: a a b c c c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              |            | Appendix in the second |            | - 10   |        | 336-     | 709   | 8894   |
| PARCAT DRED DOOK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 420                                          |            | By AZ                  | CHAR I     | QBAI   | L 0    | 1330-    | ,00   |        |
| NMDCAT PREP BOOK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              |            |                        |            |        |        |          |       |        |

By AZHAR IQBAL 0336-7098894

(d) It can be deflected by a magnetic field Sr. 16. 17. 18. 19. 20. 21. 22.

MDCAT PREP BOO

| UNIT 13                           |                                                                  | -        | -14             |         | CLEA    |         |         |                     |             |             |         | Zaya                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | m Pui              | blisher  |
|-----------------------------------|------------------------------------------------------------------|----------|-----------------|---------|---------|---------|---------|---------------------|-------------|-------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------|
| . A sading                        | ctive mate                                                       | rial ha  | s an i          | nitial  | amou    | nt 32   | g. Afte | er 60 d             | lays it     | reduc       | es to 2 | 2g, then                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | the ha             | alf life |
| of radioa                         | ctive mate                                                       | rial is: |                 |         |         |         |         |                     |             |             |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| (a)                               | 8 days                                                           |          | (D)             | 60 d    | ays     | diage   | (c)     | 30                  | days        |             | (d      | ) 15 da                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | iys                |          |
| 32. A source                      | initially co                                                     | inter    | val of          | three   | half    | ives?   | ive ni  | ichae.              | How         | many        | of the  | se nucle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | i have             | 2        |
| decayed                           | anter a time                                                     | inter    | (b)             | 15No    |         | 100     | (0)     | 7No                 |             |             |         | Na                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |          |
| (a) 1                             | 6                                                                |          | 1000            | 16      |         |         |         | 7N ₀     |             |             | (d      | 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |          |
| 33. The half-l                    | ife of a rad                                                     | lioacti  | ve ele          | ment    | is sucl | h that  | gof a   | quant               | ity of      | it deca     | ays in  | 12 days                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Wha                | t        |
| fraction o                        | f it remain                                                      | undec    | ayed            | after   | 24 day  | ys?     |         |                     |             |             |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| (a) 0                             |                                                                  |          | (b)             | 1       |         |         | (c)     | 1 128               |             |             | (d)     | $\frac{1}{32}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                    |          |
| 34. Size of nuc                   | eleus is of t                                                    | he ord   | er of           | 04      |         |         |         | 128                 |             |             |         | 32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                    |          |
| (a) 10                            | )-10 m                                                           |          | (b)             | 10 1    | m       |         | (c)     | 10-12               | m           |             | (d)     | 10-19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | m                  | - 97     |
| 35. When a ra                     | dioactive n                                                      | ucleus   | unde            | ergoes  | "B"     | emissi  | on th   | en its :            | atomi       | c char      | ge nu   | mber?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    | _        |
| (a) M                             | ay increase                                                      | by 1     |                 |         |         |         | (b)     | May                 | decre       | ase by      | 1       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    | - 1      |
| (c) Re                            | main same                                                        |          |                 |         |         |         | (d)     | Both                | a and       | Ь           |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| 6. Which of th                    | he followin                                                      | g is th  | e cori          | rect p  | roduc   | t of th | e α-d   | ecay:               | 88Ra2       | "→?+        | 2He4    | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                    |          |
| (a) 90 ^{T1}              | 1232                                                             | 1        | (b) 9           | Pa      |         |         |         | 86Rn                | -           |             | (d)     | 87Fr ²²                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ,                  |          |
| 7. The mass a                     | nd energy                                                        | equiva   | ilent (         | to a a. | m.u r   | espect  | tively: | 1.00                | 10-2        | 7           |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| (a) 1.6                           | $7 \times 10^{-27} \text{ kg}$<br>$7 \times 10^{-27} \text{ kg}$ | 020      | May/            |         |         |         | (0)     | 1.67                | X 10        | Kg, I       | Mev     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| (c) 1.6<br>8. A radioactiv        | / X 10 Kg                                                        | , 930 I  | o bote          | nart    | icle T  | he no   | (a)     | 1.0/                | X IU        | kg, I       | Mev     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| 8. A radioactiv                   | opes                                                             | emits    | b) L            | cotone  | icie. 1 |         |         | Isotor              |             | er nuc      |         | Isoba                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |          |
| Atomic mass                       | opes<br>s number (                                               | of an e  | leme            | nt tho  | rium    |         |         |                     |             | umbe        |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    | oduct    |
| of this radio                     |                                                                  |          |                 |         |         |         |         |                     |             |             |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| number of al                      |                                                                  |          |                 |         |         |         |         |                     | 200         |             |         | - mainto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 02                 | ,. The   |
|                                   | $\beta$ , $\beta = 3$                                            |          |                 |         |         |         | (c)     | $\alpha = 6$        | . B =       | 0           | (d)     | $\alpha = 4$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ß =                | 6        |
| In alpha deca                     |                                                                  |          |                 |         |         |         | ber to  | the d               | lecree      | s in n      | eutro   | n numb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | er is:             |          |
| (a) 2:1                           |                                                                  | (b       |                 | : 1     |         |         | (c)     |                     |             |             | (d)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| In the uraniu                     | m radioac                                                        | tive se  | ries t          | he ini  | tial nu | icleus  | is 92 l | J ²³⁸ an | d the       | final       | nucle   | us is 82 P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | b ²⁰⁶ . | When     |
| the uranium                       | nucleus de                                                       | cays to  | lead            | , the   | numb    | er of   | α-pai   | ticle a             | and $\beta$ | -part       | icle a  | re:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |          |
| (a) $8\alpha$ , 6                 |                                                                  |          | 8a              |         |         |         |         | 10 B.               |             | -           |         | 12α, (                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 5B                 |          |
| Curie is an un                    | it of:                                                           |          |                 |         |         |         |         |                     |             |             | -       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 111                |          |
| (a) Disint                        | tegration co                                                     | onstant  | (b)             | Ra      | dioact  | ive ma  | ass     | (c)                 | Activ       | ity         | (d)     | Atom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ic nun             | nber     |
| Which of the f                    |                                                                  |          |                 |         |         |         |         |                     |             | 10          |         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                    |          |
| (a) Electr                        |                                                                  |          |                 | utrons  |         | (       | c) (    | Duarks              |             |             | (d)     | Lepto                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ne                 |          |
| A radioactive                     | substance                                                        | has a    | half li         | fe of   | four n  | nonth   | s. Th   | ree _f              | ourth       | of the      | e enhe  | tance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ill de             | cav      |
| n:                                |                                                                  |          |                 |         | 0 - 1   |         |         |                     | our th      | or the      | c subs  | tance v                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | in ac              | cay      |
| (a) 3 mont                        | ths                                                              | (b)      | 8 m             | onths   |         | - (     | c) 4    | mont                | he          |             | (d)     | 12 mo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | nthe               |          |
| Radiation which                   | ch strongl                                                       | v inte   | racts           | with    | mat     | ter d   | ne to   | its c               | hara        | and         | has     | a short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ran                | ae ae    |
| ompared to ga                     | ımma radı                                                        | ations   | is:             | 200000  |         |         | 10      |                     | margo       | anu         | паз     | a short                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Tan                | ge as    |
| (a) Alpha r                       | radiation                                                        | (b)      | X-ra            | ivs     |         | - (     | e) B    | eta ra              | diatio      | n           | (d)     | None o                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | f the              | 00       |
| ntiparticle of                    | electron is                                                      | *01 s    | S. Bri          |         |         |         | 1000    | cta ra              | ulatio      |             | (u)     | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | of the             | sc       |
| (a) n ₁                |                                                                  | (b)      | TH ₁ |         |         | 10      | ) P     | ositro              |             |             | (4)     | Montai                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                    |          |
| radioactive su<br>ter 5 years wil | ibstance h                                                       | as a h   | alf-li          | fe of 1 | veer    | The     | fract   | ion                 | f this      |             | (a)     | Neutri                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10                 |          |
|                                   | l be:                                                            | 2 he     |                 |         | year    | . The   | Tract   | ion of              | this        | matei       | iai, ti | nar wou                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ia re              | main     |
| (a) 1/32                          |                                                                  | (b)      | 1/16            |         |         | -       | 1 14    | 1110                |             |             | (1)     | 21/22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |          |
| the state of                      |                                                                  | (0)      | 1710            |         |         | (c      | ) 13    | /16                 |             |             | (d)     | 31/32                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                    |          |
| 31. 32.                           | 33. 34.                                                          | 35       | 26              | 25      | 1 20    |         |         |                     |             |             | later a | No. of Concession, Name of |                    | -        |
| d c                               |                                                                  | 35.      | 36.             | 37.     | 38.     | 39.     | 40.     | 41.                 | 42.         | 43.         | 44.     | 45.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16.                | 47.      |
|                                   | ББ                                                               | d        | c               | c       | d       | Ь       | b       | a                   | c           | Ь           | Ь       | a c                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    | 1        |
| AT PRED DAY                       |                                                                  | 1        | 111             |         | -       | Act I   |         |                     | State Line  | al Property | -       | and the same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                    |          |

**NUCLEAR PHYSICS** 

By AZHAR IQBAL 0336-7098894

| UNIT 13                                                                                              | NUCLEAR                                          | PHYSICS              | 10:10               | 7-                       | Zayan Publisher                 |
|------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------|---------------------|--------------------------|---------------------------------|
| 48. A radioactive nuc<br>$A(\alpha), A_1(\beta), A_2(\alpha), A_3(\beta)$<br>respectively, then what | leus undergoes a $\gamma$ ), $A_4$ . If the mass | number an            | f decay<br>d atomic | according<br>number of a | to the scheme<br>are 180 and 72 |
| (a) 192 and 69                                                                                       | t are these number a                             | (0)                  |                     |                          |                                 |
| (-)                                                                                                  |                                                  | (d)                  | 176 and             | of madium wi             | Il be disintegrated             |
| (c) 172 and 69<br>49. The half-life of radius                                                        | n is 1600 years. Wha                             | t fraction of        | a sample            | or radium wi             | n be disintegrated              |
| after 6400 years:                                                                                    | (b) 1/6                                          | (c)                  |                     |                          | 1/8                             |
| 50. The SI unit of decay c                                                                           | onstant is:<br>(b) m ⁻¹               | (c)                  | s ⁻¹     | (d)                      | ms ⁻¹                |
| Total Action 100                                                                                     | 48.                                              | 49.                  | Commis              | 50                       |                                 |
| Sr. Ans:                                                                                             | c                                                | c                    |                     | C                        | LINE R PRINT A                  |
|                                                                                                      | PRACTIC                                          | E TEST               | NO. 3               | and the same of the same |                                 |
| . Which is the bigger un                                                                             | it of radioactivity? (b) Rutherford              | (c)                  | Becquere            | (d)                      | None of these                   |
| 1 24 (unified mass scale                                                                             | ) is equal to:                                   | A PERSONAL PROPERTY. |                     | (4)                      | 031 MeV                         |

|    | Which is the bigger unit of radioactivity?  (a) Curie (b) Rutherford                                                                                                     | (c)        | Becquerel                             | (d) | None of thes             |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------|-----|--------------------------|
|    | 1 u (unified mass scale) is equal to:                                                                                                                                    | (c)        | 900 MeV                               | (d) | 931 MeV                  |
|    | (a) in atomic nuclieus was fi                                                                                                                                            | rstly o    | liscovered by:                        |     |                          |
| 3. | (a) 785 MeV  The presence of neutron in atomic nuclieus was fi  (a) Rutherford  (b) Bohr  The end product of the decay of 90 Th ²³² is 82 Pb ²⁰⁸ . | (c)        | Chadwick                              | (d) | Michelson<br>number of a |
| 4  | The end product of the decay of 90 Ih IS 82 PD .                                                                                                                         | W IIIC     | ii or the rolling                     |     |                          |
| 4. | and beta particles emitted respectively.                                                                                                                                 |            | 4, 6                                  | (d) | 6, 0                     |
|    | (a) Always stable (b) May be unstable                                                                                                                                    | (b)<br>(d) | Always unstable<br>Converted to photo | ons |                          |
| 6. | In gamma ray emission from a nucleus:  (a) Only the proton number changes  (b) Only the neutron number changes                                                           |            | op as or events or                    |     | Carlotte a la            |

(c) There is no change in the proton number and the neutron number (d) Both the neutron number and the proton number change 7. 238U decays through a series of transformations to final stable nuclide. The particles emitted in the successive are:  $\alpha\beta\beta\alpha\alpha$ . Which nuclide is not produced during the series of transformation? (c) -234Pa (b) 230Th (a) 226Ra 8. Which of the following is true about  $\alpha$ -particle?

(a) Can cause extensive damage due to ionization in body

(b) Have relatively small penetration power in body

(c) Have relatively large penetration power in body

(d) Both a and b

9. One curie is equal to:

(a) 10 Gy

(a)  $3.7 \times 10^7$  disintegration per second

(c)  $3.7 \times 10^9$  disintegration per second 10. 10 J kg⁻¹=

(b) 1000 rad

(c) 0.1 rad

(d) Both a and b

|        |    |    |    | -  | No. of Street, or other | NAME OF THE PARTY OF | Q       | 9. 10.         |
|--------|----|----|----|----|-------------------------|----------------------|---------|----------------|
| Sr. 1. | 2. | 3. | 4. | 5. | 6.                      | 1.                   | h       | d d            |
| Ans: a | d  | c  | Ь  | c  | C                       | a                    | AD IORA | L 0336-7098894 |

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(b)  $3.7 \times 10^8$  disintegration per second

(d)  $3.7 \times 10^{10}$  disintegration per second

| 11. The half-value period $T_h$ and $T_m$ respective     | d and the n               | nean val   | ue perio       | d of a             | radio   | etive   | elem   | ent are           | denoted          |
|----------------------------------------------------------|---------------------------|------------|----------------|--------------------|---------|---------|--------|-------------------|------------------|
| (a) $T_h = T_m$                                          | (b) T _h        | $>T_m$     |                | c) T.              | = 0.69  | 27      | 14     | D T               | - T              |
| 12. Half-life of two radio                               | active subst              | ance A     | and B a        | re respe           | ectivel | v 20    | minut  | ne and            | 21 _m  |
| Initially the sample of                                  | I A and B I               | iave equ   | al numb        | er of n            | uclei.  | After   | 80 m   | inutes            | the ratio        |
| remaining number of A                                    | A and B nucl              | ei is:     |                |                    |         |         |        | mutes,            | the ratio        |
| (a) 1:16                                                 | (b) 1:1                   |            | (              |                    |         |         | (d     | 4:1               |                  |
| 12 Cobalt-57 is radioactive                              | e, emitting $\beta$       | particle:  | s. The ha      | If-life fe         | or this | is 270  | days   | . If 100          | mg of this       |
| in on onen confain                                       | er, the mass              | of Coba    | t-57 afte      | r 540 da           | ys wil  | l be:   |        |                   | g or rais        |
| (a) 50 mg                                                | (b) $\frac{50}{\sqrt{2}}$ | ma         | 6              | 25.                |         |         |        |                   |                  |
| (a) 50 mg                                                | $\sqrt{2}$                | my         |                | 25 г               | lig     |         | (d     | ) Zer             | 0                |
| 14. Which of the following                               | particle has              | the great  | est mass       | ?                  |         |         |        |                   |                  |
| (a) Electron                                             | (b) Pro                   | ton        | (c             | ) Posi             | itron   |         | (d)    | ) Pho             | ton              |
| 15. The decay constant of a                              | radioactive               | element    |                |                    |         |         | s:     |                   |                  |
| (a) $9.70 \times 10^{-1} s^{-1}$                         |                           |            |                | ) 1.97             |         | -       |        |                   |                  |
| (c) $1.97 \times 10^{-5} s^{-1}$                         |                           |            |                | ) 1.97             |         |         |        |                   |                  |
| 16. The mass ratio of two r                              | adio-isotope              | s is 3:1.  | Their ha       | lf-lives           | are 12  | 2 and   | 16 hr  | s respe           | ectively. Th     |
| ratio of their mass after                                |                           |            |                |                    |         |         |        |                   |                  |
| (a) 2:1                                                  | (b) 3:2                   |            |                | 4:3                |         |         | (d)    | 5:4               |                  |
| 17. In the effects of exposu<br>exposed is caused when e | re to nigh                | levels of  | ionizing       | radiat             | ion, d  | eath    | of 60  | percei            | nt of peopl      |
|                                                          |                           |            |                |                    |         |         | -      |                   |                  |
| (a) 2500                                                 | (b) 4000                  | 7) af V    | (c)            | 1500               |         |         | (d)    | 2000              | reason in        |
| 18. Relative biological effecti                          | (b) 30                    | c) 01 A-F  |                |                    | α-part  | icles   |        |                   | more is          |
| (a) 1                                                    | (b) 30                    | blants and | (c)            |                    |         |         | (d)    | 1.7               |                  |
| 19. The effect of radiation on                           | body absor                | bing it re |                |                    |         |         |        |                   |                  |
| (a) RBE<br>(c) Extra dose                                |                           |            |                | Radia              |         |         | h      |                   |                  |
| 20. Gray in terms of SI base u                           | mits can be               | evnresse   | (d)            | Abso               | rbed d  | ose     |        |                   |                  |
|                                                          | (b) Kgm ²      |            | (c)            | m ² a-2 |         |         | (4)    | m ⁻² s | 2                |
| 21. How much dose is absorbe                             |                           |            |                |                    |         | ,       | (a)    | m s               |                  |
| (a) 10 mSv                                               |                           |            |                | 200 n              |         |         | (4)    | 1000              | ) C              |
| 22. Chromosome abnormalitie                              | . ,                       |            |                |                    |         |         | (a)    | 1000              | msv              |
| (a) Cancer                                               | es due to rac             | mation C   |                | Abno               |         | ac in   | futura | ganare            | tions            |
| (c) Eye cataracts                                        |                           |            |                | All of             |         | ics III | ruture | genera            | itions           |
| 23. The nuclear forces are con                           | sidered as                |            | (u)            | All Ol             | tilese  |         |        |                   |                  |
|                                                          |                           |            |                | Electr             | omaga   | atio    |        |                   |                  |
| (a) Strong force                                         | (b) Weak                  | force      | (c)            | Force              |         | ietic   | (d)    | All               | of these         |
| 24. The source of gamma radia                            | tion is                   |            |                | Force              |         |         |        |                   |                  |
|                                                          | The state of              |            |                | C                  | lectro  | and the | 10     |                   |                  |
| . (a) Outside nucleus                                    | (b) Inside                | e nucleus  | (c)            |                    |         |         | (d)    | No                | ne of these      |
| 25. Numbers of neutrons presen                           | nt in a nucle             | no io air. | an ha          | tra                | insitio | n       |        |                   |                  |
|                                                          |                           |            |                |                    | _       |         |        |                   | all disease and  |
| 26. Radiation can cause                                  | (b)  N = A                | - 2        | (c)            | N = A              | Z       |         | (d)    | N =               | Z - A            |
| (a) Burning                                              | 1) 0                      |            |                |                    |         |         |        |                   |                  |
| 27. Beta particle is actually a                          | b) Cancer                 |            | (c)            | Flu                |         |         | (d)    | Allo              | fthese           |
| (a) Fast manifest a                                      |                           |            |                |                    |         |         |        |                   |                  |
| (a) Fast moving electron:<br>(c) Electron at rest        | S                         |            | (b)            | Slow n             | noving  | elect   | ron    |                   |                  |
| C) Electron at rest                                      |                           |            | (d)            | None o             | f these | 2       |        |                   |                  |
| Sr. 11. 12. 13. 14.                                      | 15 10                     |            | 10             | . 1                |         |         | -      |                   |                  |
| Ane: 13. 14.                                             |                           | 17. 18.    | 19. 20         | 0. 21.             | 22.     | 23.     | 24.    | 25. 2             | 6. 27.           |
| - C C B                                                  | c b                       | b a        | a c            | a                  | d ·     | a       | b      | b d               | a                |
| NMDCAT PREP BOOK                                         |                           |            | and the second |                    |         | 78      | di     | atuda.            | 10 - CO. 11 A. 1 |
| CALL PREP BOOK                                           |                           | 425        | Sir .          | P.                 | AZH     | ARI     | ORAI   | 033               | 36-7098894       |

**NUCLEAR PHYSICS** 

UNIT 13

| UNIT 13                                                     |                          |        | N      | CLE    | AR     | PHY     | SICS    |        | 14     | -1,7        |       |        | Za     | yan I       | Publi |
|-------------------------------------------------------------|--------------------------|--------|--------|--------|--------|---------|---------|--------|--------|-------------|-------|--------|--------|-------------|-------|
| 28. The charge on                                           | gamma ra                 | ys is: |        |        |        |         |         | 0      |        |             |       | (d)    | No     | no of       | these |
| (1 11                                                       |                          | (h)    | -      |        |        |         | (c)     | 0      |        |             |       | (u)    | INO    | ile of      | these |
| 29. Ozone reflects                                          | rac                      | diatio | n fro  | om su  | n ba   | ck in   | to spa  | ce:    | .he    |             |       | (d)    | AII    | of th       | 000   |
|                                                             |                          | (10)   | 1117   | ./     |        |         | (C)     | ///    | pha    |             | 220   |        | All    | OI ti       | icsc  |
| (a) IR<br>30. Radon-222 has                                 | 136 neutr                | ons,   | how    | many   | neu    | trons   | are ti  | here   | in K   | adon        | -220. | (d)    | No     | na of       | these |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       |        |        | ne or       | these |
| (a)  31<br>31. If ₉₄ Pu ²³⁸ decay     | an alpha                 | parti  | cles t | he no  | w at   | omic    | numt    | er a   | nd n   | iass i      | lume  | (d)    | No     | no of       | these |
|                                                             |                          | (h)    | 7.4    | 4 9    |        |         | 101     | 43     | 1,7/   |             |       | (0)    | NO     | ne or       | these |
| (a) 234,90<br>32. Which of the fo                           | llowing h                | as the | mas    | s clo  | sest i | n val   | ue to t | that   | of the | e pos       | itron | (d)    | No     | utrino      |       |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       |        |        |             | ,     |
| (a) Proton<br>33. Which of the fo                           | llowing is               | not a  | mong   | gelen  | nenta  | ary pa  | rticle  | s but  | tare   | comp        | osed  | orei   | emei   | itary       |       |
| particles?                                                  |                          |        |        |        |        |         |         |        |        |             |       |        |        |             |       |
| English before the same                                     | S                        | (b)    | Ha     | dron   | S      |         | (c)     | Qu     | arks   |             |       | (d)    | Let    | tons        |       |
| (a) Photon<br>34. If a C-14 has a                           | half-life of             | 573    | 0 yea  | rs, th | en h   | ow le   | ong w   | ill it | take   | for c       | luant | ity of | C-14   | in s        | ampi  |
| drop to 1/8 of it                                           | nitial quan              | tity?  |        |        |        |         |         |        |        |             |       |        |        |             |       |
| (a) - 2.58 x :                                              | 10 ⁴ years    |        |        |        |        |         | (b)     | 1.7    | 72 x 1 | 0° ye       | ars   |        |        |             |       |
|                                                             |                          |        |        |        |        |         | (d)     | 2.5    | 8 x 1  | 0° ye       | ars   | 1- 64  |        |             |       |
| (c) 1.44 x :<br>5. When ₉₀ Th ²³⁸ tra | nsforms t                | oB     | 210 th | en th  | ne nu  | mber    | of the  | e em   | itted  | $\alpha$ an | d β-  | partio | de is, | resp        | ectiv |
| (a) $7\alpha$ , $7\beta$                                    |                          | (h)    | 40     | τ, 7 β |        |         | (c)     | 4α     | ,48    |             |       | (d)    | 4α,    | $1\beta$    |       |
| 6. The γ-rays rad                                           | i- manhe                 | are II | sed i  | n      | in     | dust    | rv:     |        |        |             |       | Te !   |        |             |       |
| 6. The γ-rays rad                                           | tograpus .               | (b)    | M      | edica  | 1      |         | (c)     | Sp     | orts   |             |       | (d)    | Ent    | ertaii      | nmen  |
| (a) Agricul<br>7. Nucleus of an a                           | tom whos                 | o ato  | mic I  | nass   | is 24  | consi   | sts of: | THE    |        |             |       |        | 7 19   |             |       |
| (a) 11 elec                                                 | trone 11 r               | roton  | s and  | 1 13 n | eutro  | ns      | (b)     |        | elect  | rons,       | 13 pi | rotons | and    | 11 ne       | utron |
| (a) 11 elec                                                 | ons and 13               | neut   | rons   |        |        |         | (d)     | 11     | proto  | ns an       | d 13  | electi | ons    |             |       |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       |        |        |             |       |
| 8. In beta decay:                                           | rent and da              | mohte  | er nu  | clei h | ave sa | ame n   | umbe    | rof    | protoi | 15          |       |        |        |             |       |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       |        |        |             |       |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       |        |        |             |       |
| (d) The da                                                  | ughter nuc<br>ughter nuc | leus h | as or  | ne net | itron  | more    | than t  | he p   | arent  | nucle       | us    |        |        |             |       |
| 9. Which specie h                                           | as no net                | charg  | e:     |        |        |         |         |        |        |             |       | (1)    | An     | autrii      | 10    |
| (-) Ann.                                                    | articles                 | (b)    | A      | proto  | n      |         |         | An     | elect  | ron         |       | (a)    | AII    | cutin       | 10    |
| (a) An α-γ                                                  | estem of u               | nits ( | SI) o  | f rad  | ioact  | ivity i | is:     |        |        |             |       | (1)    | Ma     | 25          |       |
| (a) Pacque                                                  | rel                      | (b)    | Cı     | irie   |        |         | (c)     | Fer    | mi     |             |       | (d)    | Mo     | es<br>a mod | nced  |
| (a) Becque                                                  | riod of a                | radio  | activ  | e nu   | clide  | is 3 t  | ours.   | In 9   | ) hou  | rs, its     | acti  | vity v | VIII D | e reu       | uccu  |
| a factor of:                                                | 1100 01 0                | 71     |        |        |        |         |         |        |        |             |       |        | 1/9    |             |       |
| (a) 1/27                                                    |                          | (b)    | 1/6    | 5      |        |         | (c)     | 1/8    |        |             |       | (d)    | 1/9    |             |       |
| 42. In 1932 James                                           | Chadwick                 | disco  | vere   | d:     |        |         |         |        |        |             |       |        | Min    | laura       |       |
| (-) Dunton                                                  |                          | (h)    | 1-16   | ectron |        |         | (c)     | Net    | utron  |             |       | (d)    | Nuc    | ieus        |       |
| 43. Which one of the                                        | e followin               | g is f | orme   | d du   | ring l | beta e  | missi   | on?    |        |             |       | CIL    | 00     |             | baca  |
|                                                             |                          |        |        |        |        |         |         |        | tiapho | eres        | FA    | (d)    | Non    | e of t      | nesc  |
| (a) Isobars<br>44. Half-life of a ra                        | dioactive s              | uhsts  | ance   | is hov | v mu   | ch pe   | rcent   | of it  | s me   | an lif      | e?    |        |        |             |       |
|                                                             |                          |        |        |        |        |         |         |        |        |             |       | (d)    | 85 %   | 0           |       |
| (a) 35 %<br>45. What is the effe                            |                          | nhy:   | ical   | r che  | mica   | l rea   | ction   | on r   | adioa  | ctivi       | ty?   |        |        |             |       |
| 45. What is the effe                                        | et of some               | pnys   | icai ( | ,, che |        |         | (b)     | It pr  | oceed  | is wit      | hag   | reater | spee   | d           | all 4 |
| (a) It slows                                                |                          |        |        |        |        |         | (d)     | It i   | s no   | t aff       | ected | as     | it i   | s a         | nucle |
| (c) It sudde                                                | nly stops                | 1      |        |        |        |         | ,-/     | pher   | ome    | non         |       |        |        |             |       |
|                                                             |                          |        |        |        |        |         |         | 7      |        |             |       |        |        |             |       |
| A BEET MINE                                                 | THE LINE                 |        |        |        |        |         |         | 20     | 20     | 40.         | 41.   | 42.    | 43.    | 44.         | 45.   |
| Sr. 28. 29.                                                 | 30. 31.                  | 32.    | 33.    | 34.    | 35.    | 36.     | 37.     | 38.    | 39.    |             | 9.4   | 200    | -      | b           | d     |
| Ane c h                                                     | h h                      | h      | h      | b      | a      | b       | c       | c      | d      | a           | c     | c      | a      | 0           | u     |

| N IN COLUMN | 28. |     | 1020200 | 100 |     |     | 100 | 120 | 26  | 27  | 38  | 30  | 40. | 41. | 42. | 43. | 44. | 45. |
|-------------|-----|-----|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Sr.         | 28. | 29. | 30.     | 31. | 32. | 33. | 34. | 35. | 30. | 31. | 30. | 37. | 10. | No. |     |     | b   | d   |
| Ans:        | c   | b   | b       | b   | b   | b   | b   | a   | b   | C   | c   | d   | a   | c   | С   | a   | U   | -   |

| INIT 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| 6. What is the cha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| (a) 5 s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| (a) $0.69 N_0$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| What will happen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (b) Less half of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| the degree and type (a) Strength of a (c) Energy of a the Becquerel is equal to the company of t                                                   | PRACTION PRACTION PRACTION PRACTION Per Minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CE TEST No radiation dependent (b) P. (d) A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | NO. 4 ds on: roperty of matter ll of these                                                                                                                                                                                  | per second                                                                                                                                                         |
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| de degree and type  (a) Strength of 1  (c) Energy of ra  the Becquerel is equivalent  (a) One disintegy  (b) Ten disintegy  (c) Ten disintegy  (d) J kg ⁻¹ at is true about tr  (d) Radioactive iso  (e) In this technique                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | PRACTIC  e of damage caused by reproduction diation diation diation diation diation diation per minute ration per minute dose (rad) is equal to: (b) 0.1 J kg ⁻¹ racer techniques regardiate propes help to follow the deteror radioactive atoms are selected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ce TEST Nation dependent of the Property of th | ds on: roperty of matter ll of these ne disintegration disintegration J kg ⁻¹ isotopes? mical or biologic                                                                                                        | per second per second (d) 0.01 J kg ⁻¹ cal process                                                                                                      |
| de degree and type  (a) Strength of (c) Energy of rate  Becquerel is equivalent  (a) One disintegriation absorbed of (a) I J kg ⁻¹ at is true about tr  ) Radioactive iso  In this technique  Tracers are use                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | PRACTIC  e of damage caused by reproduction diation per minute dose (rad) is equal to: (b) 0.1 J kg ⁻¹ diater techniques regardiation diation | ce TEST Nation dependent of the Property of th | ds on: roperty of matter ll of these ne disintegration disintegration J kg ⁻¹ isotopes? mical or biologic                                                                                                        | per second per second (d) 0.01 J kg ⁻¹ cal process                                                                                                      |
| ne degree and type  (a) Strength of 1  (c) Energy of rate Becquerel is equ  (a) One disinteged diation absorbed of 1 J kg ⁻¹ Radioactive iso  In this technique Tracers are use fertilizer by a p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | PRACTIC  e of damage caused by reproduction diation per minute dose (rad) is equal to: (b) 0.1 J kg ⁻¹ diater techniques regardiation diation | ce TEST Nation dependent of the Property of th | ds on: roperty of matter ll of these ne disintegration disintegration J kg ⁻¹ isotopes? mical or biologic                                                                                                        | per second per second (d) 0.01 J kg ⁻¹ cal process                                                                                                      |
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| de degree and type  (a) Strength of 1  (c) Energy of rate Becquerel is equivalent absorbed (a) I J kg ⁻¹ at is true about tr  (b) Radioactive is (c) In this technique of the                                           | PRACTIC  e of damage caused by reproduction addition and to: ration per minute ration per minute ration per minute (b) 0.1 J kg ⁻¹ racer techniques regardication at the color shelp to follow the color at radioactive atoms are sold in medicine to detect mediant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ce TEST Nation dependence (b) P (d) A (b) On (d) Te (c) 10 (c) 10 (c) regardioactive course of a chemisubstituted for stalignant tumors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ds on: roperty of matter ll of these me disintegration in disintegration J kg ⁻¹ isotopes? inical or biologic table atoms of seand in agricult                                                                   | per second per second (d) 0.01 J kg ⁻¹ cal process same kind ure to study uptake of                                                                     |
| he degree and type  (a) Strength of 1  (c) Energy of rate Becquerel is equivalent absorbed of a 1 J kg ⁻¹ at is true about true. Radioactive ison In this technique. Tracers are use fertilizer by a possible and the second and the                                           | PRACTIC  e of damage caused by reproduction addition and to: ration per minute ration per minute ration per minute (b) 0.1 J kg ⁻¹ racer techniques regardication at the color shelp to follow the color at radioactive atoms are sold in medicine to detect mediant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ce TEST Nation dependence (b) P (d) A (b) On (d) Te (c) 10 (c) 10 (c) regardioactive course of a chemisubstituted for stalignant tumors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ds on: roperty of matter ll of these me disintegration in disintegration J kg ⁻¹ isotopes? inical or biologic table atoms of seand in agricult                                                                   | per second per second (d) 0.01 J kg ⁻¹ cal process same kind ure to study uptake of                                                                     |
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| de degree and type  (a) Strength of 1  (c) Energy of rate Becquerel is equivalent absorbed (a) I J kg ⁻¹ at is true about tr  (b) Radioactive is (c) In this technique of the                                           | PRACTIC  e of damage caused by reproduction addition and to: ration per minute ration per minute ration per minute (b) 0.1 J kg ⁻¹ racer techniques regardication at the color shelp to follow the color at radioactive atoms are sold in medicine to detect mediant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | CE TEST N radiation depen (b) P (d) A (b) On (d) Te (c) 10 ing radioactive course of a chen substituted for s alignant tumors ent is 20 secondater, the number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ds on: roperty of matter ll of these ne disintegration n disintegration J kg ⁻¹ isotopes? nical or biologic table atoms of s and in agricult nds. At any i ber of radioact                                       | per second per second  (d) 0.01 J kg ⁻¹ cal process same kind ure to study uptake of  nstant the number ive nuclei left are:                            |
| ne degree and type  (a) Strength of 1  (c) Energy of rate Becquerel is equivalent absorbed of a 1 J kg ⁻¹ at is true about true at the control of the cont                                          | PRACTIC  e of damage caused by reproduction addition and to: ration per minute reation per minute adose (rad) is equal to: (b) 0.1 J kg ⁻¹ reacer techniques regardications are selected in medicine to detect mediant  of a radioactive element medicine. Ten seconds less to the seconds le | ce TEST Nation dependence (b) P (d) A (b) On (d) Te (c) 10 (c) 10 (c) regardioactive course of a chemisubstituted for salignant tumors                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ds on: roperty of matter ll of these ne disintegration n disintegration J kg ⁻¹ isotopes? nical or biologic table atoms of s and in agricult nds. At any in                                                      | per second per second (d) 0.01 J kg ⁻¹ cal process same kind ure to study uptake of                                                                     |
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| Ans: | 2. | 3. | 4. | 5. | 6  |
|------|----|----|----|----|----|
| 0    | b  | d  | d  | C  | 0. |

| 26. I  | (a)                | 0.693                                 | 0          | 10     | 11     | 12          | 13.            | 14.    | 15.    | 16.   | 17.    | 18.     | 19.     | 20.    |        | c     | b      | d              | Ь              | b    |
|--------|--------------------|---------------------------------------|------------|--------|--------|-------------|----------------|--------|--------|-------|--------|---------|---------|--------|--------|-------|--------|----------------|----------------|------|
| 26. 1  |                    |                                       |            |        | - /    | P.)         | n au           | 111    | mers.  |       | (0)    | 10      | 10      | 20     | 21.    | 22.   | 23.    | 24.            | 25.            | 26   |
|        | The hal            | f life of                             | radi       | ioacti | ive e  | leme        | ent is:        |        |        |       | (c)    | λ/0.    | 693     |        |        | (d)   | 1/.    | 1              | Inc.           | Lad  |
| 25. I  | sotope             | s of an                               | elem       | ent h  | nave ( | a dii<br>b) | fferen<br>Neut | ron    | mbe    | r of: | (c)    | Elec    | tron    |        |        | (d)   | At     | om             |                |      |
|        | (-)                | Ca                                    |            |        | 4      | DI          | CI             |        |        |       | (c)    | CI      |         |        |        | (u)   | mig    | gi.            |                |      |
| 24 1   | (a)<br>Which       | 2400 y                                | t is u     | sed (  | to ab  | sort        | gam            | maı    | adia   |       | ?      | day Y   |         | 100    |        | (d)   | Pt     | ,              |                |      |
| u      | inchan             | ged alto                              | er.        |        |        | (h)         | 3200           | ) veai | rs     |       | (c)    | 640     | 0 yea   | ars    |        | (d)   | 48     | 800 y          | ears           |      |
| 23. T  | The hal            | Half of                               | f rac      | dium   | is a   | bou         | t 160          | 0 ye   | ars.   | Of 1  | 00 g   | 01 ra   | ulul    | . CA   |        |       | 10     | 1              |                |      |
|        | (a)                | Halfo                                 | f dec      | ay     |        |             |                |        | 1914   |       | (d)    | All     | ding    | n exi  | stins  | nov   | v, 25  | g w            | ill re         | ma   |
|        |                    |                                       |            |        |        |             |                |        |        |       | (b)    | 10000   | arter   | D 70   |        |       |        | -dia           |                |      |
|        |                    | Coppe<br>of rad                       |            |        |        |             |                |        |        |       |        |         |         |        |        |       |        |                |                |      |
| 21. R  | adioth             | Coppe                                 | used       | in tr  | catt   | (b)         | Cob            | alt-60 | )      | W.    | (c)    | Gol     | ld      |        |        | (d)   | 3      | IVUI           |                |      |
|        | (a)                | 0.69 m                                | in .       |        | contr  | nent        | ofc            | ancer  | usu    | ally  | use g  | amm     | a-ra    | ys fo  | rm:    |       |        | lver           |                |      |
| 20. W  | hat is             | the hal                               | lf-tin     | ne of  | a ra   | (b)         | 2 mi           | in     | .,     |       | (c)    | 2.5     | 7 min   | 1      |        | (d)   | 2.     | 31 m           | III            |      |
| 41     | (a)                | the hal                               |            |        | (      | b)          | 2<br>activ     | e san  | nple ( | (in m | inut   | es), if | its r   | nean   | life   | is 20 | 0s?    | 21             | in             |      |
| 9. H   |                    | ny dov                                | vn q       | uark   | s in   | Neu         | tron:          |        |        |       | (c)    | 3       |         |        |        | (d)   | 4      |                |                |      |
|        | (-)                | C 14                                  |            |        | - (    | U)          | 14-1           |        |        |       | (c)    | 0-1     | 1,0     |        |        | DAG.  |        |                |                |      |
| 8 W    | /hat w             | ll be th                              | ne pr      | rodu   | ct of  | beta        | dec            | ay of  | C-1    | 4?    | (0)    | 0-1     | 14      |        |        | (d)   | ) B    | e-14           |                |      |
|        |                    |                                       |            |        |        |             |                |        |        |       | (c)    | U       |         |        |        | (0    | ol, in | Q'             |                |      |
|        | (a)                | leus is                               | mad        | e un   | of n   | ore         | neut           | rons   | than   | pro   | tons   |         |         |        |        | (ď    | N      | one o          | of the         | se   |
|        |                    |                                       |            |        |        |             |                |        |        |       | (c)    | 1.0     |         |        |        | (d    | 1 2    |                |                |      |
| 6. In  | the e              | ffects of                             | nt de      | se ir  | sie    | ert         | is:            |        |        |       |        |         |         |        |        | (d    | 2      | 0              |                |      |
| 60     | (c)                | Relativ                               | of er      | rnosi  | ire t  | o hi        | gh le          | vels   | of io  | nizi  | ng ra  | diati   | on, 1   | temp   | orar   | y 10  | w iei  | tinty          | 15 0           | a uo |
|        |                    |                                       |            |        |        |             |                |        |        |       | (d)    |         |         |        |        |       |        |                | ie c           | ans  |
| 5. R   | BE is a            | qualit                                | ty fa      | ctor   | and    | n is        | ect            | ,      |        |       | (b)    | Ref     | feren   | ce bo  | ody e  | ffect | ivene  | SS             |                |      |
|        | (a)                | _ m                                   | 1          | -4     |        |             |                |        | for:   |       |        |         |         |        |        | cc .  |        |                |                |      |
|        |                    | $D = \frac{E}{m}$                     |            |        | 1      | (b)         | D =            | E      |        |       | (c)    | D =     | = E >   | k m    |        | (a    | , ,    | E              | THE .          |      |
| 14. A  | bsorbe             | d does                                | can        | be w   | vritte | en a        | s:             |        |        |       |        |         |         |        |        | (4    | ) 1    | $=\frac{n}{F}$ | 1              |      |
|        | (2)                | 2 rem                                 |            |        |        | (0)         | 55.            |        |        |       | (0)    | 2 11    |         |        |        |       | NUIT : |                |                |      |
| 13. T  | he bac             | Rem<br>k grou                         | nd r       | adia   | tion   | to w        | hich           | we a   | re ex  | pose  | (c)    | 2 n     | Sv      | , Pe   | ,      | (d    | ) 3    | Sv             |                |      |
| 12. 0  | (a)                | Rem                                   |            |        |        | (b)         | Gray           | y      |        |       | (c)    | he as   | rerac   | e ne   | r ves  |       |        | 14             |                |      |
| 12 6   | )ne iou            | 0.1 gra<br>le of er                   | nerg       | y abs  | orbo   | ed p        | er kil         | ogra   | m of   | bod   | y is e | qual    | to 01   | ne:    |        | (d    | ) B    | ecqu           | erel           |      |
| 11. 1  | rad =              | 0.1 gr                                | av         | -      |        | (b)         | 0.1            | sieve  | rt     |       | (c)    | 0.0     | l gra   | ly     |        | (d    | , 0    | 01 31          | CVCII          |      |
|        |                    |                                       |            |        |        |             |                |        |        |       |        |         |         |        |        | 14    | 0      | 01 6           | evert          |      |
|        | (c)                | D = D                                 | ), X       | RBE    |        |             |                |        |        |       | (d)    | RBE     | = L     | e      |        |       |        |                |                |      |
| 10. E  | (a)                | $D_{e} = I$                           | $D \times$ | KBE    |        |             |                |        |        |       | (b)    | RB      | E =     | Dex    | U      |       |        |                |                |      |
| 10 E   | (a)                | ent dos                               | se ca      | n be   |        |             |                |        |        |       |        | n. n.   |         | n .    | D      |       |        |                |                |      |
| 9. 1   | (a)                |                                       | life       | 2000   |        | (b)         | Half           | flife  |        |       | (c)    | Co      | mple    | te lif | e      | (d    | ) [    | ecay           | ille           |      |
| will a | (a)                | $A_1 = 3$ e in wh                     | A3         | abor   | it tw  | o-th        | ird o          | fthe   | aton   | ns of | a rac  | lioac   | tive:   | samı   | ole d  | ecay  | is ca  | Hed:           | li Ca          |      |
| p      | periods            | , then:                               |            |        |        | (b)         | A1 =           | 4A:    |        |       | (c)    | $A_1$   | $= A_3$ | /3     |        | (d    | ) A    | 1 = 2          | A ₃ |      |
| 8. I   | f A ₁ a | nd A ₃ r                   | repre      | esent  | the    | dec         | ayed           | aton   | 18 01  | a su  | Ustai  | ice o   |         | -      |        |       |        |                |                |      |
|        | (a)                | nuclide<br>Y :<br>nd A ₃ r | = X        | - 4    |        | (b)         | Y              | =      | X + 1  | 0.00  | (c)    | nce d   | lurin   | g th   | e firs | st an | d the  | thi            | = >            | If I |

| 77 The                                                                                                                                         | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | A STATE OF THE PARTY OF THE PAR |                                         | NU                                                                   | CLE    | AR                                      | PHYS                                        | ICS               |                   |                       |                  |           | 7                  |                 | 0        |
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| Z/. Inc                                                                                                                                        | isotope of 23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 35U92 has                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                         | nui                                                                  | mber   | of no                                   | utron                                       | s:                | 4-30              |                       | 3.00             |           | 1                  | uyan            | Publisi  |
|                                                                                                                                                | a) 141                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         | 142                                                                  |        |                                         |                                             | (c)               | 143               |                       |                  | -         | d) 14              | 14              |          |
| 28. An e                                                                                                                                       | lement X wi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ith $A = 1$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4 and                                   | Z = 6                                                                | has    | how                                     | many                                        | neu               | trons             | 701                   |                  | (         | u) 14              | 44              |          |
| (a                                                                                                                                             | ) 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)                                     | 8                                                                    |        |                                         |                                             | (c)               | 14                |                       |                  | -         | d) 2(              | ,               |          |
| 29. Radio                                                                                                                                      | oactive mat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | erial de                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | cays b                                  | y sim                                                                | ultar  | ieous                                   | emis                                        | sion              | of ty             | vo pa                 | rticle           |           | -                  |                 |          |
|                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         | e tim                                                                | e, in  | year                                    | s, afte                                     | r w               | hich o            | ne-fo                 | urth             | of the    | mate               | rial :          | e naii-i |
|                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         |                                                                      |        |                                         |                                             |                   |                   |                       |                  |           |                    |                 |          |
| (a)                                                                                                                                            | 2430 yea                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | irs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | (b)                                     | 162                                                                  | 0 yea  | rs                                      |                                             | (c)               | 3240              | year                  | rs               | (0        | 1) 42              | 260 v           | ears     |
| 30. Samp                                                                                                                                       | le of radioa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ictive el                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CHIE CHIL                               | ***                                                                  | *****  | a 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 488 OI                                      | 24                | om di             | ecaye                 | ed to            | 3 gm      | in 36              | min             | utes H   |
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| (a)                                                                                                                                            | 12 g                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b)                                     | 2 g                                                                  |        | 745                                     | . (                                         | c)                | 6 g               |                       |                  | (d        | 1) 8               | 2               |          |
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| 32. Proton                                                                                                                                     | s and neutr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | ons are                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                         |                                                                      |        | aller                                   |                                             |                   |                   |                       |                  |           |                    |                 |          |
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| 4. How m                                                                                                                                       | uch dose wi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                         |                                                                      |        | to th                                   | e skin                                      |                   |                   |                       |                  |           |                    |                 |          |
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| 7. 1  Sy =                                                                                                                                     | 100                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (b) 1                                   | 0                                                                    |        |                                         | (c)                                         | 0                 | .1                |                       |                  |           | 0.01               |                 |          |
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| (a) 2                                                                                                                                          | b. d.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | b) 3                                    | Sv                                                                   |        |                                         | (c)                                         | 4                 | Sv                |                       |                  | (d)       | Both               | "A"             | &"B"     |
| (a) -                                                                                                                                          | be the cha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | rge on L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3-parti                                 | icles e                                                              | emitt  | ed du                                   | ring t                                      | the               | pheno             | men                   | a of r           | adioa     | ctivity            | y?              |          |
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| The mass                                                                                                                                       | es of two                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | radioac                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | tive s                                  | ubsta                                                                | nces   | are                                     |                                             |                   | .1 .1             | ir h                  | alf-li           | ves a     | re 4               | and             | & von    |
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| When rad                                                                                                                                       | lations are                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | emitted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | from                                    |                                                                      |        |                                         |                                             |                   |                   |                       | ***              |           |                    |                 | ciemei   |
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| When rad<br>and this pr<br>(a) Ra                                                                                                              | dioactivity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 6 1 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                         | T poor                                                               |        |                                         |                                             |                   |                   |                       |                  | uange     | into               |                 |          |
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| When rad<br>and this pr<br>(a) Ra<br>(c) Nu<br>When a rad                                                                                      | dioactivity clear transn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | nutation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | oo Ra ²                      | 28 de                                                                |        |                                         | (b)                                         | Ra                | ate of            | deca                  | y                |           |                    |                 |          |
| When rad<br>and this pr<br>(a) Ra<br>(c) Nu<br>When a rad                                                                                      | dioactivity clear transn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | nutation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | oo Ra ²                      | 28 de                                                                |        |                                         | (b)                                         | Ra                | ate of            | deca                  | y                |           |                    |                 |          |
| When radiand this pr (a) Ra (c) Nu When a rad 3-particles (a)                                                                                  | adioactivity uclear transn dioactive is the isotope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | nutation<br>otope<br>finally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ₈₈ Ra ²<br>forme  | ²⁸ de                                                     | cays   | in s                                    | (b)<br>(d)<br>eries                         | Ra<br>Do<br>by t  | ate of<br>ecay la | deca<br>aw<br>nissie  | y<br>on of       |           |                    |                 |          |
| When radiand this pr (a) Ra (c) Nu When a rad 3-particles (a)                                                                                  | adioactivity uclear transn dioactive is the isotope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | nutation<br>otope<br>finally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ₈₈ Ra ²<br>forme  | ²⁸ de                                                     | cays   | in s                                    | (b)<br>(d)<br>eries                         | Ra<br>Do<br>by t  | ate of<br>ecay la | deca<br>aw<br>nissie  | y<br>on of       | three     |                    | rticl           | es and   |
| When radiand this pr  (a) Ra (c) Nu  When a radiana  3-particles (a) 8  Which one                                                              | adioactivity<br>iclear transn<br>dioactive is<br>the isotope<br>4X ²²⁰<br>of the follow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | nutation<br>otope<br>finally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ₈₈ Ra ²<br>forme  | ²⁸ de                                                     | cays   | in s                                    | (b)<br>(d)<br>eries                         | Ra<br>Do<br>by t  | ate of<br>ecay la | deca<br>aw<br>nissie  | y<br>on of       | three     | α-ра               | rticl           | es and   |
| When radiand this property (a) Ra (c) Nu When a radiangle (a) 8 Which one (c) $340Th \rightarrow \frac{23}{9}$                                 | adioactivity aclear transm dioactive is the isotope of the follow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | nutation<br>otope<br>finally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ₈₈ Ra ²<br>forme  | ²⁸ de                                                     | cays   | in s                                    | (b)<br>(d)<br>eries                         | Ra<br>Do<br>by t  | ate of<br>ecay la | deca<br>aw<br>nissie  | y<br>on of       | three     | α-ра               | rticl           | es and   |
| When radiand this pr  (a) Ra (c) Nu  When a radiana  3-particles (a) 8  Which one                                                              | adioactivity aclear transm dioactive is the isotope of the follow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | nutation<br>otope<br>finally                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 88 Ra ² forme                | ²⁸ de<br>d is:<br>₃ X ²¹⁶<br>s take | cays   | in s                                    | (b)<br>(d)<br>eries<br>(c)                  | Ra<br>Do<br>by i  | the en            | deca<br>aw<br>nissie  | y<br>on of       | three (d) | α-pa               | rtiel           | es and   |
| When radiand this property (a) Ra (c) Nu When a radiangle (a) 8 Which one (c) $340Th \rightarrow \frac{23}{9}$                                 | adioactivity aclear transm dioactive is the isotope of the follow                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | nutation<br>otope<br>finally<br>(b)<br>wing em                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 88 Ra ² forme                | ²⁸ de<br>d is:<br>₃ X ²¹⁶<br>s take | cays   | in s                                    | (b)<br>(d)<br>eries                         | Ra<br>Do<br>by t  | the en            | deca<br>aw<br>nissie  | y<br>on of       | three     | α-ра               | rtiel           | es and   |
| When radiand this pr<br>(a) Ra<br>(c) Nu<br>When a radian<br>3-particles<br>(a) 8<br>Which one (a) $\frac{34}{90}$ (b) Alpi                    | idioactivity iclear transn dioactive is the isotope is $4X^{220}$ of the follow ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | nutation<br>otope<br>finally<br>(b)<br>wing em                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 88 Ra ² forme 83 issions     | ²⁸ de<br>d is:<br>₃ X ²¹⁶<br>s take | cays   | in s                                    | (b)<br>(d)<br>eries<br>(c)                  | Ra<br>Do<br>by i  | the en            | deca<br>aw<br>nissie  | y<br>on of       | three (d) | α-pa               | rtiel           | es and   |
| When radiand this property (a) Ra (c) Nu When a radiangle (a) 8 Which one (a) 34 Th $\rightarrow$ 23 90 (a) Alpi                     | adioactivity aclear transn dioactive is the isotope 4 X ²²⁰ of the follow that a classification is the following that a classification is the classification is the following that a classification is the classification is the classification is the classification is t | nutation<br>otope<br>finally<br>(b)<br>wing em                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 88 Ra ² forme 83 issions Gam | ²⁸ de<br>d is:<br>₃ X ²¹⁶<br>s take | cays   | in s                                    | (b)<br>(d)<br>eries<br>(c)                  | Ra<br>De<br>by to | the en            | decay<br>aw<br>nissio | y<br>on of<br>n? | three (d) | α-pa<br>83<br>Phot | x ²¹ | es and   |
| When radiand this pr<br>(a) Ra<br>(c) Nu<br>When a radiana<br>3-particles<br>(a) 8<br>Which one (a)<br>$^{34}Th \rightarrow ^{23}$<br>(a) Alpi | idioactivity iclear transn dioactive is the isotope is $4X^{220}$ of the follow ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | nutation<br>otope<br>finally<br>(b)<br>wing em                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ss Ra ² forme sissions Gam   | ²⁸ de<br>d is:<br>₃ X ²¹⁶<br>s take | ecays  | in so                                   | (b)<br>(d)<br>eries<br>(c)<br>n a nu<br>(c) | Ra<br>Do<br>by i  | the en            | deca<br>aw<br>nissie  | y<br>on of<br>n? | three (d) | 83 Phot            | ons             | es and   |

| 15 Wh | ich of the | following | is/are | correct |
|-------|------------|-----------|--------|---------|
| 15 Wh | ich of the | Tollowing | 13/411 |         |

- (a) Iodine is absorbed by thyroid gland
- (b) Phosphorus and strontium are absorbed by bones
- (c) Cobalt is absorbed by liver
- (d) All of these
- 46. The SI unit of absorbed dose is:
- (b) Gray (a) Joule 47. The activity or rate of decay of a radioactive source is measured in terms of:

  - (a) Becquerel (b) Ohm (d) Coulomb
- (c) Faraday

- 48. Which of the following is true about radioactive radiations? (a) They posses ionization power (b) They can damage cells of living tissues
  - - (d) All of these

(c) Rem (d) Rad

- (c) They can penetrate in the body
- 49. Which two nuclei contain the same number of protons?
  - (b)  $^{23}_{11}Na$  and  $^{24}_{12}Mg$  (c)  $^{16}_{7}N$  and  $^{15}_{8}N$
- (d)  ${}_{14}^{32}Si$  and  ${}_{15}^{32}P$
- (a)  ${}^{12}C$  and  ${}^{14}C$ 50. The product of half-life and decay constant for any radioactive element is always:

- (d) One

| (a) Co |     | (b) 1.4 | istant for any | (c) Zero | (d  | ) One                 |
|--------|-----|---------|----------------|----------|-----|-----------------------|
| (a) C  |     | 1 46    | 47             | 48.      | 49. | 50.                   |
| Sr.    | 45. | 46.     | 47.            | 4        | а   | a                     |
| Ans:   | d   | b       | a              | a        |     | and the second second |

## PRACTICE TEST NO. 5

- 1. In the heavy elements of periodic table, the number of protons are ___ than/to the number of neutrons:
- (c) Greater
- (d) Almost zero
- 2. A radioactive nuclide decays by emitting by alpha particle, a beta particle and a gamma ray photon the change in the nucleon number is:
  - (a) 4
- (b) -2

- 3.  $\beta$ -particle from various radioactive resources all have same (d) The same energy (a) The same mass (b) The same speed (c) The

- deflection
- 4. In 420 days, the activity of a sample of polonium (Po) fell to ath of its initial value. The half-life of
  - polonium is:
- (b) 70 days
- (c) 280 days
- (d) 210 days

- 5. A nuclide  $\frac{208}{82}$ X decay to a new nucleus Y by one  $\beta^+$ -emission and three  $\gamma$ -emissions, the nuclide
  - Y is:
    - (a) 208_V
- (b) 210 v
- (c) 208 y

- 6. Decay of one radioactive nucleus per second is equal to:
- (b) One half life
- (c) One Becquerel (d) One henry

- (c) γ-emission (d) Position emission
- 7. In which radioactive disintegration, neutron dissociates into proton and electron: (a) He⁺⁺ emission (b)  $\beta$ - emission 8. The half life of radon is 3.8 days. Three forth of a random sample decay in:

- (d) 11.4 dyas
- (b) 15.2 days (a) 5.02 days

|      |    |    |    | -  | 5 | 6. | 7. | 8. |
|------|----|----|----|----|---|----|----|----|
| Sr.  | 1. | 2. | 3. | 4. | h | c  | b  | c  |
| Ane. | b  | c  | a  | a  | U |    |    |    |

NMDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

NUCLEAR PHYSICS 9. Which of the following statement(s) is /are correct?

- (a) Heavy nuclei have more number of protons than neutrons
- (b) Heavy nuclei have more number of neutrons than protons
- (c) Heavy nuclei are likely to undergo fission than fusion
- (d) Both B and C
- 10. In 88 Ra 226 Nucleus, there are:
  - (a) 128 protons and 88 neutrons
- (b) 138 neutrons and 88 protons
- (c) 226 protons and 88 electrons
  - (d) 226 neutrons and 138 electrons

11. 1 rem =

UNIT 13

- (a) 1 Sv
- (b) 0.001 Sv
- (c) 0.1 Sv
- do seltunidoso e el morad and Al (d) 0.01 Sv

- 12. Most of the cobalt is absorbed by:

- (a) Bones (b) Liver (c) Skin (d) Thyroid gland 13. In the disintegration series  $\begin{array}{c} 238 \\ 92 \end{array} \stackrel{\alpha}{\cup} \stackrel{\beta}{\to} \stackrel{A}{\times} \stackrel{A}{\to} \stackrel{A$
- (b) 88, 230 (c) 90, 234 (d) 91, 234 14. The half - life of 234Th 90 is 24 days. If 8 kilogram of this isotope is present initially, what amount
- (a) 2 kg (b) 1 kg 15. The radioactive nuclide decays by emission of four  $\alpha$ -particle. The nuclide  $X_{92}^{236}$  finally formed is: (c) 5 kg (d) 4 kg
- (a)  $_{84}X^{220}$  (b)  $_{62}X^{218}$  (c)  $_{81}X^{212}$ 16. How many types of subatomic particles are present in nucleus?
- (b) 2 17. Decay constant λ is given by:
- (c) 4 (d) 5
- 18. The percentage of the original quantity of a radioactive material left after five half lives is
  - (c)  $-N\Delta N\Delta t$

(d) 20 %

(d) 2 hours

- (b) 5% (c) 3% 19. If  $\frac{15}{16}$  of radioactive atoms decays in 16 hours, the half-life of element is:
- (a) 16 hours (b) 8 hours (c) 4 hours
- 20. The half life of an element is 160 days. What fraction of it will be left in 80 days?
- 21. The amount of charge present on strange quark is:
  - (a)  $-\frac{1}{2}e$  (b)  $+\frac{1}{2}e$

(a) 1%

- 22. How much of the mass of an atom is concentrated in the nucleus? (b) 99% (c) 100%
- 23. What is the respective number of  $\alpha$  and  $\beta$  particles emitted in the following radioactive decay (a) 6 and 8
- (b) 8 and 8
- - (c) 6 and 6
- 24. A given radioactive sample is reduced from 20 g to 1.25 g in 40 days. Its half life would be:
- (b) 8 days 25. Which one has the highest penetrating power? (a) Alpha rays
  - (b) Gamma rays
- (c) 5 days
- (d) None of these
- (c) Beta Rays 26. The half-life of an element is 160 days. What amount of it will be left in 80 days? (d) Neutron (c) 1

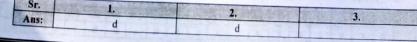
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|-------------|----|----------|-----|-----|-----|-------|-----|-----|-----|-----|----------|------------|-------|------|-----|-----|--------|---|
| Sr.<br>Ans: | 9. | 10.      | 11. | 12. | 13. | 14    | 15  | 16  | 17  | 10  | 1.0      |            | 1     |      | 250 |     |        | _ |
| Ans:        | d  | b        | d   | h   |     | 17    | 13. | 10. | 1/. | 18. | 19.      | 20.        | 21.   | 22.  | 23. | 24. | 25.    |   |
|             |    | -        | u   | D   | a   | h     | 0   | L.  | 1.0 |     | MACHINE. | The second | 10000 | -    |     |     | 40000  | - |

MDCAT PREP BOOK

| 1111 | IT 13   |                                                | NUCLEAR                                                      | PHYSICS       | OUN-             | Zayan Publisher                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|---------|------------------------------------------------|--------------------------------------------------------------|---------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UN   | 77 13   | enomenon of radio                              | activity is:                                                 | SAME WILL     |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 27.  |         | r dhamaic chance                               | a which increases of                                         | decreases v   | vith temperature | I me and desired the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|      | (a)     | Nuclear process de                             | pes not depend on ex                                         | xternal facto | r                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      | (b)     | Increase on applie                             | d pressure                                                   |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 16   | (c)     | None of the above                              | a pressure                                                   |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      | (d)     | None of the above                              | number of:                                                   |               |                  | CHAIL TO A STATE OF THE PARTY O |
| 28.  | Activit | y is proportional to                           | o and Lade                                                   | (b)           | Un-decayed n     | uclei                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|      | (a)     | Daughter nuclei                                |                                                              | (d)           | Father nuclei    | on summer one too                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|      | (c)     | Decayed nuclei                                 | ion of                                                       |               |                  | To the second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 29.  | Any ba  | aryon is a combinat                            | ion or.                                                      | (b)           | Two quarks as    | nd an anti-quark                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|      | (a)     | Three quarks                                   |                                                              |               | O                | one anti-duark                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|      | (c)     | Two quarks                                     | clife of 5 years. T                                          | The fraction  | of the atoms     | of this material that would                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 30.  | A radi  | io-isotope has a na                            | ii-life of 5 Jems                                            |               |                  | 13. In the characteristics at                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|      | decay   | in 15 years will be:                           | (b) 2/3                                                      | (c)           | 7/8              | (d) 5/8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|      | (a)     | 1/8                                            | os of certain ra                                             | dioactive is  | otope remains    | un-decayed after one hour                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 31.  | One ei  | ghth of the initial                            | mass of certain                                              | areal !       | Way I I St.      | 6 Tal.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| RE'S | The ha  | olf-life of the isotop                         | e in innutes is:                                             | (c)           | 20               | (d) 45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|      | (a)     | 8                                              | (b) 30                                                       |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 32.  | The sa  | me radioactive nuc                             | leus may emit.                                               | ultaneously   |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 4    | (a)     |                                                |                                                              | ther          |                  | Property St.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|      | (b)     | All the three $\alpha.B$                       | and y one after and                                          | Hier          |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      | (c)     | Only $\alpha$ and $\beta$ sin                  | nultaneously                                                 |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      |         |                                                |                                                              | -d ar move i  | e of su          | AND IN T. BERLEIGH AND                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 33   | The io  | nizing power when                              | we compare a,p                                               | and y rays i  | Maximum in       | α-particles                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|      |         |                                                |                                                              |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      | (c)     | Maximum in β-p                                 | articles                                                     | (d)           | d its half life  | is 5 days. After 10 days it                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 24   | The a   | tivity of the radio                            | active sample is                                             | 1.6 curie an  | iu its iiiii     | is 5 days. After 10 days it                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 34.  | antivit | y will be:                                     |                                                              | (4)           | 0.8 Ci           | (d) 0.05 Ci                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|      |         |                                                | (b) 0.5 Ci                                                   | (c)           |                  | of a radioactive nuclide                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|      | (a)     | nle consists of a r                            | adioactive nuclide                                           | X while al    | tome of X and    | of a radioactive nuclide \\display of the atoms of Y hav                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 35.  | A Sam   | on interval of time                            | e, it is found that                                          | 7/8 of the    | atoms of it was  | d % of the atoms of Y hav                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|      | Atter   | an interval of time<br>ed. The ratio (half)    | ife of x / half life o                                       | f Y) is:      |                  | (d) 3/2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|      |         |                                                | (b) 6/7                                                      | (c)           | 7/0              | Share States The Walter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|      | (a)     | 2/3 nass of a neutron is:                      | on country the                                               | 4.5           | 1.675 × 10       | 31 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|      |         |                                                |                                                              | - 40          | 4 (72 V 10-      | 61 kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|      | (a)     | 1.6/3 × 10 -31 kg                              | and the same of                                              | (d)           | 1.6/3 × 10       | nower?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|      | (c)     | $9.10 \times 10^{-31}$ kg of the radioactivity | radiations, which                                            | one has gre   | ater ionization  | waming he wastlde                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 37   | . Amon  | g the radioactivity                            |                                                              | (b)           | B-particle       | e ionization power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|      | (a)     | α-particle                                     |                                                              | (d)           | All have sam     | e loinzation p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|      | (c)     | γ-ray                                          | of decay:                                                    |               |                  | The state of the s |
| 38   | In ra   | dioactivity, the rate                          | the magnetic field                                           | d             | me 7 (H)         | 24 A cond 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|      | (a)     |                                                |                                                              | eld           | mple is rydane   | is a waterings in and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|      | (b)     | Can be kept consta                             | ant by the electric fiel                                     | d             |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      | (c)     |                                                |                                                              |               |                  | was san and har of 'Y'?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|      | (d)     | Is not affected by                             | electric and magneti                                         | rticles wha   | t are the atomi  | c and mass number of                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 30   | Acco    | rding to the equatio                           | $n \frac{\partial X}{\partial x} \rightarrow Y + 3\alpha pa$ | (c)           | Z+1.A            | c and mass number of 'Y'?  (d) $Z + 3, A$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|      | (a      | Z - 6, A - 12                                  | (b) $Z-2, A-$                                                | 4 (0)         | ACC.             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|      |         |                                                |                                                              |               |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 41   | In un   | ified mass scale mas                           | ss of proton is expr                                         | essed as:     | 1.008665u        | (d) 1.00055u                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|      | (0      | 1 007276u                                      | (b) 0.00055u                                                 | (c)           | 1.0000050        | 20 40                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| The second second | IT 13                    | 60          | Miles I    |                 |             | PHYSICS     |                          |             | 7                | yan Pul |
|-------------------|--------------------------|-------------|------------|-----------------|-------------|-------------|--------------------------|-------------|------------------|---------|
| 41.               | The amo                  | unt of e    | nergy ab   | sorbed f        | rom ioni    | zing radia  | ition per                | unit mass   | s of abso        | rbing b |
| •                 |                          |             |            |                 |             |             |                          |             | Average          |         |
|                   |                          | quivalen    |            |                 |             |             | Absorbe                  |             |                  |         |
|                   |                          | ffective of |            |                 |             | (d)         | Ineffecti                | ve dose     |                  |         |
| 42. 1             | ne ellect                | (s) or exp  | osure to   | high leve       | ds of ionia | zing radia  | tion is/are              | :           |                  |         |
|                   | (a) Ste                  | rility for  | about two  | years on        | absorbing   | g 2.5 Sv    |                          |             |                  |         |
|                   | (b) De                   | ath of 60   | % of peop  | ole expose      | to 4 Sv     |             |                          |             |                  |         |
|                   | The second second second |             | Leukaem    | iia             |             |             |                          |             |                  |         |
|                   |                          | of these    |            | W A line        |             |             |                          |             |                  |         |
| 3. 1              | he rate of               | decay o     | f a radioa | active ele      | ment, thr   | ough its li | fe time:                 |             |                  |         |
|                   | (a) Ken                  | nains con   | stant      |                 |             |             |                          |             |                  |         |
|                   | (b) Has                  | exponen     | tially dec | reasing re      | lationship  | with time   |                          |             |                  |         |
|                   | (c) Has                  | inverse I   | inear rela | tionship v      | vith time   |             |                          |             |                  |         |
|                   | (d) Is di                | rectly pro  | portional  | to time         |             |             |                          |             |                  |         |
| 4. In             | the nucle                | us of 1/8   | ), the nui | nber of p       | rotons, ne  | eutrons ar  | id electroi              | 15 are rec  |                  |         |
|                   |                          |             |            |                 |             |             | 0.8.0                    |             |                  |         |
| . Th              | e relation               | between     | half-life  | T and de        | cav const   | ant 1.      | ,0,0                     | (           | d) 8,9,8         |         |
|                   | (a) A1:                  | = 1         | (b)        | $\lambda T = 1$ | 1/2         | (0) 1       | T 1                      |             |                  |         |
| . Ho              | w many n                 | ucleons     | are there  | in an ato       | m of 235,   | (c) A       | $T = \log_e 2$           | (0          | f) $\lambda T =$ | log2T   |
|                   | (a) 92                   |             | (b)        | 123             | m or -926   |             |                          |             |                  |         |
| The               | circulati                | on of the   | blood or   | 123             |             | (c) 2.      | 35                       | (d          | ) 327            |         |
| (                 | (a) Radi                 | oactive s   | odium-24   | in be stuc      | ned by us   |             |                          |             |                  |         |
| (                 | c) Radi                  | oactive I   | odine-131  |                 |             |             | obalt-60                 |             |                  |         |
| Rela              | tive biole               | orical eff  | Cactivenes | - (DDE)         |             | (d) Pl      | osphorus-                | 32          |                  |         |
| (                 | a) 2                     | gicai cii   | ccuvenes   | s (KRF)         | of α-parti  | cles from   | nosphorus-<br>natural ra | dio activi  | tv is:           |         |
| The               | maximus                  | n cafa lin  | (b)        | ,               |             | (c) 10      |                          | (d)         |                  |         |
| (0                | a) 1 mS                  | u sale iii  | nit dose 1 | or person       | , working   | g in nuclea | r power s                | tation is:  | Mary 1           |         |
|                   | ) 1 mS                   |             |            |                 |             | (b) 1 r     | em per we                | ek          |                  |         |
| In th             | e offects                | v per day   |            |                 |             |             |                          |             |                  |         |
| canea             | d whon                   | or expo     | sure to    | high leve       | ls of ioni  | zing radia  | em per day               | ility for a | bout tw          | o vears |
|                   |                          | quivaler    |            | sievert is      | :           |             | TO SHOUL                 |             |                  | Jeans   |
| (a                | ) 1.5                    |             | (b)        | 2.5             |             | (c) 1.0     |                          | (d)         | 2.0              |         |
| 10                | RAI MI                   |             |            |                 |             | THE THEFT   |                          | (4)         | 2.0              |         |
| r.                | 41.                      | 42.         | 43.        | 44.             | 45.         | 46.         | 47.                      | 48.         | 49.              | 50.     |
| ıs:               | b                        | d           | a          | d               | c           | c           | a                        | c           | a                | 4.00    |
|                   |                          |             | -          |                 |             |             |                          |             |                  | b       |

| TRAC                                                             | TICE TEST NO. 6                                      |
|------------------------------------------------------------------|------------------------------------------------------|
| 1. The effect of radiation on the body ab                        | sorbing it depends on:                               |
| (c) Part of body absorbing radiation                             | (b) Energy of radiation                              |
| Which of the following is/are effects of                         | f low level radiation:                               |
| (c) Disruption of blood cells  Technetium is typically used for: | (b) Stiffening of lungs (d) Both A and B             |
| (a) Plasma volume<br>(c) Kidney test                             | (b) Thyroid uptake scans (d) Plasma volume vein flow |
| Sr. 1.                                                           | 2. 3.                                                |



NMDCAT PREP BOOK

By AZHAR IQBAL 0336-7098894

(a) 1.007276u

Sr. 27. 28. 29. 30. 31. 32. 33.

| JNIT 13                  |                                      |          |             |           | NUC             | CLE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | AR P  | HYS    | ICS    | DU                 |        |       |           |                | Zo           | iyan     | Pub    | lish    |
|--------------------------|--------------------------------------|----------|-------------|-----------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--------|--------------------|--------|-------|-----------|----------------|--------------|----------|--------|---------|
| Which                    | of the follo                         | owing    | is th       | e sa      | me fo           | or iso                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | tope  | s?     |        |                    |        |       |           | 01             | - 10         |          |        |         |
| (9)                      | Neutrons                             |          | (           | (b)       | Pro             | tons                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        | (c)    | Elec               | ctron  | IS    |           | (d)            | A            | lof      | hem    |         |
| . The nu                 | cleus shap                           | e is co  | nsid        | erec      | l to b          | e                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |        |        |                    |        |       |           | . 15           | 0            | 200      |        |         |
| (2)                      | Square                               |          | . (         | (b)       | Rec             | tang                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        | (c)    | Sph                | iere   |       |           | (d)            | C            | ircula   | ır     |         |
| Which                    | radiation                            | is used  | d in g      | ree       | nhou            | se ef                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | fect? |        |        |                    |        |       |           | (A)            | -            |          |        | -       |
| (a)                      | UV                                   |          |             | (b)       | 1R              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 900   |        | (c)    | X-r                | ays    |       |           | (d)            | G            | amm      | a ray  | S       |
| Gamm                     | a rays are                           | attrac   | cted t      | tow       | ards            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        |        | Sylvel             |        |       |           |                |              |          |        |         |
| (a)                      | Negative                             | plate    |             |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (b)    | Pos                | itive  | plate | e<br>than | din            |              |          |        |         |
| (-)                      | No defler                            | tion     |             |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (d)    | Pas                | s thr  | ougn  | the i     | nediu<br>of at | ome          | nres     | ent i  | n #1    |
| Numbe                    | r of atom                            | s deca   | aying       | in        | a pa            | rticu                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | lar p | perio  | d is   | I ROLL IN          | _ to   | num   | ber       | 01 at          | Oms          | pres     | (1)    |         |
| beginn                   | ing of the I                         | period   | :           |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        |        | Lave               | arcal  | v pre | porti     | onal           |              |          |        |         |
| (a)                      | Directly p                           | oropor   | tiona       | ıl        |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (b)    |                    | epen   |       | porti     | Ontai          |              | 1        |        |         |
| (c)                      | Faual                                |          |             |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (a)    | ind                | epen   | uent  |           |                |              |          |        |         |
| How m                    | any curies                           | are t    | here        | in 1      | 010             | Bq?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |       |        | (-)    | 0.2                | 7 (;   |       |           | (d)            | 0.           | 7 Ci     |        |         |
| · (a)                    | 0.17 Ci                              |          | -           | (b)       | 0.3             | 7 Ci                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 7     |        | (c)    | 0.2                | fori   | gina  | Lacti     | vity v         | vill r       | ema      | in af  | ter     |
| . Half-lif               | 0.17 Ci<br>e of radios               | ctive    | nucl        | ides      | is 20           | ) hou                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | rs. V | vnat   | iract  | ion o              | . 011  | 5     | 11 112    | 344731         | 100          | Guin     |        |         |
| hours?                   |                                      |          |             |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (c)    |                    |        |       |           | (d)            |              |          |        |         |
| (a)                      | 1/2                                  |          | - (         | (b)       | 2               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        |        | 7                  |        |       |           | unla           |              |          |        |         |
| If a nuc                 | leus releas                          | se gan   | nma         | ray       | s its I         | mass                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | beco  | me:    | (c)    | Unc                | chan   | ged   |           | (d)            | Q            | uarte    | E      |         |
| (a)                      | Double                               |          | (           | (b)       | Hal             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |        | E 24   | am (               | deca   | ved   | to 3      | gm i           | n 36         | min      | utes.  | He      |
| Sample                   | Double of radioa                     | ctive    | elem        | ent       | with            | init                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | iai m | met 1  | 2 mir  | utes:              |        | ,     |           |                |              |          |        |         |
| much o                   | f original s                         | sampi    | e ren       | nan       | ieu a           | ite!                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        | (-)    | 20                 |        |       |           | (d)            | 8            | g        |        |         |
| (a)                      | 12 g                                 |          | (           | (b)       | 6 g             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       | .1 6-  | (c)    | nizat              | ion I  | radia | tion      | per t          | init         | syl      | relati |         |
| Absorb                   | 12 g<br>ed dose D                    | is def   | ined        | as e      | nerg            | yab                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | sorbe | ed ire | (c)    | Tim                | ne .   |       |           | (d)            | A            | rea      |        |         |
| (a)                      | Mass                                 |          | (           | (b)       | Cha             | arge                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        | (0)    | 1 111              |        |       |           | m a            |              |          |        |         |
| 1 ruther                 | rford is eq                          | ual to   | )           |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (0)    | 107                | Ra     |       |           | (d)            | 10           | )5 Bc    | 1      |         |
| 1-1                      | 104 Pa                               |          | - 1         | (b)       | 10 ⁶ | Bq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |        | (c)    | 10                 | Dq     |       |           | Les I          |              |          |        |         |
| Radioa                   | ctive radia                          | tions    | are t       | ised      | to d            | estro                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | y:    |        | (c)    | · Rac              | teria  | and.  |           | (d)            | Dar          | nage     | d org  | ans     |
| (a)                      | Healthy C                            | ells     | 1           | (D)       | Can             | cero                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | us ce | lis    | (0)    | Dac                |        |       |           | all p          |              |          |        |         |
|                          | anark                                | e in el  | lectro      | on:       |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (c)    | 2                  |        |       |           | (d)            | 3            |          |        |         |
| (0)                      | 0                                    |          | (           | (b)       | 1               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       | dian   | (c)    | nolo               | niur   | n is  | foun      | d to           | be 1         | 2.5%     | o of   | init    |
| After c                  | 0<br>ertain laps<br>y. If the ha     | e of t   | time,       | the       | frac            | tion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | of ra | adioa  | on di  | poio               | on of  | ftim  | e lap     | se is          |              | days     |        |         |
| quantit                  | v. If the ha                         | III IIIe | or by       | OLUL      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       | 2 12   | 1-1    | 276                |        |       |           | (d)            | 1.2          | 40       |        |         |
| (a)                      | 34.5                                 |          | (           | (b)       | 414             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       | 0      | (c)    | loe T              | he f   | inal  | nucle     | eus w          | ill b        | e        |        |         |
| A nucle                  | 34.5<br>us emits ar                  | a α-p    | articl      | le, f     | ollow           | ed b                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | y two | p-p    | artic  | An                 | isoto  | ne o  | fthe      | origi          | nal o        | ne       |        |         |
| (a)                      | An isolone                           | e or ur  | COLL        | F         |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (d)    | Non                | e of   | thes  | e         | N C            |              |          |        |         |
|                          | An isobar                            | of the   | orig        | inal      | one             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | dose   | not cl             | hanc   | re.   |           |                |              |          |        |         |
| As mass                  | number i                             | ncrea    | ses, v      | whic      | h of            | the 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ollow | ing    | (a)    | Vol                | ume    | ,     |           | (d)            | B            | indin    | g ene  | ergy    |
| (a)                      | Mass                                 |          | (           | b)        | Den             | sity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |        | (c)    | o rad              | liati  | on, t | he nu     | cleu           | s mu         | st       |        |         |
| When t                   | Mass<br>he nucleus                   | of an    | unst        | able      | ator            | m em                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | its o | nly g  | amn    | Los                | o pro  | tons  |           | (d)            | G            | ain p    | roton  | IS      |
| (a)                      | Gain energ                           | zv       | (           | b)        | Loss            | ener                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | gy    |        | (c)    | Los                | pie    |       |           | 1              |              | CH       |        |         |
|                          | a unit of:                           |          |             |           |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | A ST   | D                  | 1      | tu    |           | (d)            | Iso          | otope    | es     |         |
|                          | m 1' 4'-                             | ity      | (1          | b)        | Cond            | ductr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | vity  |        | (c)    |                    | istivi | ty    |           | (0)            | -10          |          |        |         |
| (a)                      | le of energ                          | vahse    | orbed       | l ne      | r kg            | of bo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | dy is | equ    | al to: |                    |        |       |           | (4)            | Te           | n gra    | ıv     |         |
| Tom ices                 | ie of cherg                          | , and    | (1          | b)        | Ten             | Becq                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | uerel |        | (c)    | One                | gray   |       |           | (d)            |              | 6.       |        |         |
| Ten jou                  | One rem                              |          | 10          | ,         | ie in           | dicat                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ed b  | y its  | activ  | ity m              | easu   | red   | ın:       | (1)            | e:           | evert    |        |         |
| Ten jou                  | One rem                              | diatio   | n con       | Irce      |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 77.50 |        | (c)    | Curi               | e      |       |           | (d)            | 21           | evert    |        |         |
| (a)                      | One rem                              | diatio   | n sou       | irce      | Grav            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (0)    | Cu.                | -      |       |           |                |              |          |        |         |
| Ten jou (a) The stre (a) | One rem<br>ength of rad<br>Becquerel | diatio   | n sou<br>(t | rce<br>o) | Gray            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        | (6)    |                    |        | -     |           | 10             | 20           | 21       | 22.    | 23      |
| (a)<br>. The stre        | One rem<br>ength of ra<br>Becquerel  |          | (1          | 0)        | Gray            | Towns or the same of the same |       | 13.    | 14.    | THE REAL PROPERTY. |        | 17.   | 18.       | 19.            | 20.          |          | -      | -       |
| (a)<br>. The stre        | One remember of rade Becquerel       | diatio   | n sou<br>(b | 9.<br>c   | Gray  10.       | Towns or the same                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |        |        | THE REAL PROPERTY. |        | -     |           | <b>19</b> .    | <b>20.</b> b | 21.<br>a | 22.    | 23<br>a |

NMDCAT PREP BOOK

| UNIT 13                   |                        |               |         | 1         | NUCL          | EAR     | PHYS    | SICS    |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         | 7200          | 0        |
|---------------------------|------------------------|---------------|---------|-----------|---------------|---------|---------|---------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------------|----------|
| 24. Cobal                 | -60 is a se            | ource         | for:    | RATE      |               | NE SUN  | E ST    | 10 50   | Shull-               | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1000    | 7 10    | Zayı          | an Publi |
| (a)                       | α-rays                 |               |         | (b) /     | B-rays        |         |         | (c)     | y-ray                | S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         | (4)     | A 11 -        | Cal      |
| 25. Which                 | of the fol             | lowing        | g is/ar | e effe    | cts of        | high l  | evel r  | adiati  | on:                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | (u)     | All           | of these |
| (a)                       | Ulceration             | on            |         |           |               |         |         | (b)     |                      | ning o                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | of lung | •       |               |          |
| (c)                       | Disrupti               | on of b       | blood   | cells     |               |         |         | (d)     | D'                   | Contract of the Contract of th |         |         |               |          |
| 26. Half lift<br>to radio | e of radiu             | m is a        | bout    | 1600 y    | vears.        | In ho   | w mai   | ny yea  | irs sha              | ill the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | earth   | loose   | all ite       | radiu    |
|                           |                        |               |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | 10000   | an no         | radium   |
| (a)                       | 1590 ×                 | 10° ye        | ars     |           |               |         |         | (b)     | 1590                 | × 101                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2 vear  | 5       |               |          |
| (c)                       | 1590 × 1               | 1024 y        | ears    |           |               |         |         | (d)     | Marian               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| 27. An elem               | Greater th             | nd to         | be na   | turall    | y radi        | oactiv  | e if it | has 2   | :                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| (a)                       | Equal to               |               |         |           |               |         |         |         | Less th              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| 20 When 2                 | 28Th                   | )2<br>        |         | 212       |               |         | , FB    | (d)     | None o               | of thes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | e       |         |               |          |
| 28. When respective       | oly tra                | Instor        | ms to   | 83        | Bi, tl        | nen tl  | he nu   | ımbei   | of t                 | he e                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | mitted  | α &     | B pa          | rticles  |
|                           |                        |               |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| (a)                       | $8\alpha$ , $7\beta$   |               | (6)     | $4\alpha$ | $.7\beta$     |         | (       | c) 4    | $\alpha$ . 1 $\beta$ |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | (d)     | 40,4          | 0        |
| 29. A radioa              | ctive elen             | ient ha       | as hal  | f-life (  | of 2 ye       | ars, it | s deca  | yed a   | moun                 | t afte                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | r 8 ve  | irs wi  | Il he a       | Imaat.   |
| (a)                       | 00%                    |               | (b)     | 88.       | 25%           |         | (       | c) 9    | 3.75%                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | (d)     | 83 500        | most:    |
| 30. The deca<br>will be:  | y constan              | it of a       | radio   | pactiv    | e elen        | ent is  | 1.5     | × 10    | 9 per                | secor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | nd. Ite | mean    | 1:50 :        | 9        |
|                           |                        |               |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | mean    | i ille i      | n second |
| (a) 1                     | $.5 \times 10^9$       |               | (b)     | 6.6       | $7 \times 10$ | )8      | (c      | ) 4.    | 62 × 1               | 08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -       | d) 1    | 025.          | 801.     |
| 1. Emission (a)           | of B-rays              | ın a r        | adioa   | ctive (   | decay         | result  | s in a  | daug    | hter el              | emen                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | tshow   | ing a   | 0.35 >        | 100      |
| (a) (c) C                 | hange in               | nass n        | o. but  | not in    | charg         | ge no.  | (b      | ) CI    | nange i              | n both                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1       | ing a   |               |          |
| 2. The half li            | hange in d             | narge         | no. bu  | it not    | in mas        | s no.   | (d      | ) CI    | nange i              | n eith                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | er      |         |               |          |
| (a) 8                     | davs                   | 0 10011       |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| Faual dos                 | e (abcort              |               | (b)     | 12 d      | ays           |         | (c)     | 60      | days                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6       | 1) 45   | days          |          |
| 6. Equal dose<br>(a) Pr   | oduce con              | ea do         | ses) o  | diffe     | rent r        | adiati  | ons:    |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ,       | , 4.    | uays          |          |
| (c) Al                    | oduce san<br>ways caus | ie bioi       | ogical  | effec     | t             |         | (b)     | Do      | not pr               | oduce                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | same    | biolog  | gical et      | feet     |
| The exposi                | re of V                | e canc        | er      |           |               |         | (d)     | Alv     | vays c               | ause li                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ungs ir | fection | n             | icci     |
| . The exposu              | entgen                 | ays an        | d y-r   | ays ar    | e mea         | sured   | in ter  | rms o   | f:                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| Excessive r               | adiation               | vnoon         | (b)     | Curie     |               |         | (c)     | Bec     | querel               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | . (d    | 0 0     | hm            |          |
| Excessive r (a) Alte      | ration of g            | Aposu         | ire cai | n caus    | se dea        | th by   | variet  | y of n  | nechai               | nism i                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | nelud   | ing:    |               |          |
| (c) Low                   | grade fev              | enenc         | mater   | ial       |               | (0)     | De:     | struct  | on of                | compe                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | onents  | in bo   | ne ma         | rrow     |
| The half-life             | of a rad               | ei<br>ininat- |         | _         |               | (d)     | Bot     | th a ar | nd b                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         | ne ma         | 1011     |
| The half-life<br>will be: | or a radi              | 018010        | pe is   | 5 year    | s. The        | e fract | ion o   | faton   | is left              | in thi                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | is subs | tance   | after         | 15 vear  |
| (a) (1)                   | times of o             |               |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               | 15 year  |
| (c) (1/8                  | ) times of             | riginal       | 200     |           |               |         | (b)     | (3/4    | ) times              | of or                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | riginal |         |               |          |
| Half-life of a            | radionat               | origin        | ai      |           |               |         | (d)     | (7/8    | ) times              | ofor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | riginal |         |               |          |
| Half-life of a            | easing ten             | ive ele       | ment    | can b     | e deci        | reased  | by:     |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5       |         |               |          |
|                           | easing pre             | прегац        | ire     |           |               |         | (b)     | Cha     | nging                | volun                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ne      |         |               |          |
| mong the r                | asing pre              | ssure         |         |           |               |         | (d)     | Can     | t be d               | ecreas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | sed     |         |               |          |
| Among the ra (a) α-pa     | dioactivi              | ty rad        | liation | is, wh    | ich or        | ne has  | great   | ter pe  | netra                | tion r                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ower    | ,       |               |          |
|                           |                        |               |         |           |               |         | (b)     | B-pa    | rticle               | P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Onci    |         |               |          |
| (c) γ-ray                 |                        |               |         |           |               |         | (d)     | All     | nave sa              | ame n                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | anatra  | tion -  |               |          |
| he nucleus of             | I an atom              | is alv        | ways:   |           |               |         | ,       |         |                      | mic p                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | chetra  | tion p  | ower          |          |
| (-) 103111                | very charg             | ged           |         |           |               |         | (b)     | Neg     | tively               | ahan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |         |               |          |
| (c) Neutr                 | ai                     |               |         |           |               |         | (d)     | May     | be no                | char                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ged     | -       |               | 1        |
|                           |                        |               |         |           |               |         | (-)     | way     | oc po                | sitive                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ly cha  | rged (  | or neur       | ral      |
| e                         | Marin                  | 1 1 1 1 1 1   |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| Sr. 24.                   | 25. 26.                | 27.           | 28.     | 29.       | 30.           | 21      | 120     | 1.20    |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         | 34      | The same      | diam'r.  |
| ns: c                     | c d                    | a             |         | 1000000   | 1000          | 31.     | 32.     | 33.     | 34.                  | 35.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 36.     | 37.     | 38.           | 39.      |
|                           | - 0                    | 1 4           | c       | C         | b             | c       | a       | b       | a                    | d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | C       | d       | C. Department |          |
|                           |                        |               |         |           |               |         |         |         |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |         |         |               |          |
| AT PREP BO                | OK                     | 1             | 10      |           |               | 10      |         |         |                      | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |         | u       | С             | a        |

| UNIT 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                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| 40. When the mass of sample of a radioactive substance decreases, half life of the sample:  (b) Decreases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6. When a radioactive nucleus undergoes "β" emission then its atomic charge number?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| (a) Increases (d) May increase or decrease                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 41. The half life of radioactive element depend upon:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 7 Which of the following statements about the mass of separated nucleons and the mass of the                                                                                                                                                                                                                                                                                                                                                                                                                                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| (a) Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | nucleus they form is correct? 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| (c) Amount of radioactive substance (d) Nature of element.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | (a) The sum of the masses of separated nucleons is greater than the nucleus mass                                                                                                                                                                                                                                                                                                                                                                                                                                      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| this the nucleus producing:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | (b) The sum of the masses of separated nucleons is less than the nucleus mass                                                                                                                                                                                                                                                                                                                                                                                                                                         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| (a) One P, one v and one $\beta$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| (c) One P one B and one anti neutrino (d) All of the above                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| to the state of the purcleus is called:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 8. Atomic mass number of an element thorium is 232 and its atomic number is 90. The end produc                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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Th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| the stime element at a given instant of time is 10° disintegration/second. If                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| at 1 to E.C. of this element is 1 second. Then the late of occas and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | (a) $\alpha = 3, \beta = 3$ (b) $\alpha = 6, \beta = 4$ (c) $\alpha = 6, \beta = 0$ (d) $\alpha = 4, \beta = 6$                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| (a) 12 per sec (b) 250 per sec (c) 300 per sec (d) 250 per sec                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | The second secon |
| 45. Of the following particles, the one which perturbation (c) Deutron (d) α-particle                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (a) Length (b) It is not any unit (c) Activity (d) Atomic number 10. The decay constant $\lambda$ of a radioactive sample:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (a) Floton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 46. Radioactive decay is a:  (b) Regular process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| (a) Random process                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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A radioactive material has an initial amount 32 g. After 60 days it reduces to 2 g, then the half-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 47. One microgram of matter converted into energy will give:<br>(a) $90.1 \times 10^{10} \text{ J}$ (b) $9 \times 10^{3} \text{ J}$ (c) $9 \times 10^{7} \text{ J}$ (d) $9 \times 10^{5} \text{ J}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| (a) 90 J × 10 J (b) 9 × 10 J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| 48. Which radioactive element is present in air:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 12. The half-life of radium is about 1600 years. If 100 g radiun existing now, 25 g will remain un                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| (a) U (b) Rn (c) Kr (d) Ra                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| (a) U (b) Rn (c) Ni 49. After two hours, one sixteen of the starting amount of a certain radioactive isotope remains                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| undecayed. The half-life of the isotope is.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 13. Radio isotopes A & B have half lives of 10 days and 15 days after 1 month What is the anti-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| (a) 15 minutes (b) 45 minutes (c) 30 minutes (d) 1 hour $\frac{12^{38}}{100} = \frac{100}{100} = \frac{100}{100$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | and the state of t |
| (a) 15 minutes (b) 45 minutes (c) 30 minutes (d) $1 \text{ hour}$<br>50. The radioactive decay of uranium into thorium is expressed by the equation ${}_{92}\text{U}^{238} \rightarrow {}_{90}\text{Th}^{234} + \text{X}$ ,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| milione by it.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 14. Starting with a sample of pure 6 Cu, 7/8 of it decays into Zn in 15 minutes the corresponding half                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| (b) A proton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| (a) An electron (b) An alpha particle (c) A deuteron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 15 16 17 18 49 50.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| Sr. 40. 41. 42. 43. 44. 45. 40. 47.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 15. The number of protons in a nucleus is called:  (a) Charge number  (b) Nucleon number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Ans: c d c c d b a a b c d                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| PRACTICE TEST NO. 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 16. Among the radioactivity radiations, which radiation can blacken the photographic film?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| PRACTICE ILIST NO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| 1. The half life of a certain radioactive isotope is 32 hours. What fraction of a sample would remain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | (c) γ-ray (d) All of these                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 17. In given nuclear reaction α and β particles emitted in radioactive decay of 200 v. 168 v.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| after 16 hours? (a) 0.25 (b) 0.71 (c) 0.50 (d) 0.29 (d) 0.29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| (a) 0.25 (b) 0.71 (c) 0.30  2. In a radioactive decay, neither the atomic number nor the mass number changes. Which of the                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| following would be emitted in the decay process?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 18. Genetic effect of radiation is radiation damage to:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| following would be emitted in the decay process:  (a) Proton (b) Neutron (c) Electron (d) Gamma ray photon                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| (a) Proton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 3. Strontium-90 is used as: (a) R-source (b) y-source (c) \alpha-source (d) Neutron source                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| (a) $p$ -source $P_{n}^{226} \rightarrow P_{n}^{226} \rightarrow$ | 19. How much energy is absorbed by a man of 100 kg who receives a lethal whole body equivalent dose of 500 rem in form of low energy neutrons for the Deliver a lethal whole body equivalent                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (a) $\beta$ -source (b) $\gamma$ -source (c) $\gamma$ -source 4. Which of the following is the correct product of the $\alpha$ -decay: ${}_{88}Ra^{226} \rightarrow ? + {}_{2}He^4$ :  (b) ${}_{91}Pa^{231}$ (c) ${}_{86}Rn^{222}$ (d) ${}_{87}Fr^{223}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | (a) 22 : Carry and the energy neutrons for which KBE is 10?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| (a) 1116.52 (b) a. P3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 5 A radioactive nucleus emits a beta particle. The parent and daughter nuclei are:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| (a) Isotopes (b) Isotones (c) Isotomers (d) Isobars                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    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| 2000 Control (2000 Control (20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 437 By AZHAR IORAL 0326 7008804                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

| 21 | ١. | Rad | ioac | tivity | is a |
|----|----|-----|------|--------|------|
|    |    |     |      |        |      |

- Spontaneous Phenomena
- Nuclear Phenomena
- Stochastic / Random Phenomena
- (b) iii & i (a) i & ii
- (c) ii & iii (d) i,ii & iii

## 22. The half life of radon gas is:

- (b) 3.8 days (a) 23.5 min
- (c) 4500 years (d) 1620 years
- 23. 280 days old radioactive sample has activity 6000 dps (disintegration per second). After 140 days activity decreases to 3000 dps. The initial activity in dps was: (a) 24000 (b) 12000 (c) 16000 (d) 9000

- 24.  $\alpha$ .  $\beta$  and  $\gamma$  rays emitted by a radioactive substance are passed through a region containing a magnetic field at right angles to their path. The energy gained will be:
  - (a) Maximum for α-rays

- (b) Maximum for y-rays
- (d) Zero for all of them
- (c) Minimum for β-rays 25. A 75 kg person receives a whole body radiation dose of 24 m-rad, delivered by α-particles for which RBE factor is 12. The equivalent dose in rem is:
  - (a) 0.29
- (b) 0.97 (c) 0.50 (d) 0.65
- 26. How much energy is absorbed by a man of mass 80 kg who receives a lethal whole body equivalent dose of 400 rem in the form of low energy neutrons for which RBE factor is 10? (b) 54 J (c) 40 J (d) 48 J
  - (a) 32 J

- 27. The damage from α-particles is unless the source :
  - (a) Large, enters the body
- (b) Small, enters the legs
  - (c) Small, enters the body

- (d) Large, enter the arms
- 28. If RBE factor = 10, De = 400 rem, absorbed dose D = ?
  - (a) 0.2 Gy
- (b) 0.04 Gy (c) 0.02 Gy (d) 0.4 Gy
- 29. The activity of a radioactive isotope decreases from 8000 to 1000 in 60 years. The half life of isotope will be
  - (a) 10 year
- (b) 20 years
- (c) 30 years
- (d) 40 years
- 30. Find the probability that the nucleus of 57Ra221 undergoes decay after three half-lives, if it's a radioactive substance which has a half-life of 6 days.
  - (a) 1/6
- (b) 3/2
- (c) 7/8
- 31. The electron emitted in  $\beta$  radiation originates from where?
  - (a) Inner orbits of atom
  - (b) Free electrons existing in nuclei
  - (c) The decay of a neutron in a nuclei
  - (d) Photon escaping from a nuclei
- 32. Which rays need medium to travel
- (a) X-rays (d) No radiation need medium to travel
- (c) Gamma rays

- 33. Which rays cannot be produced by electronic transitions? (b) Beta (c) Gamma (d) All of these
- (a) Alpha
- (a) way of oxeds broughten col.

- 34. Average life in terms of decay constant is:

  - (a)  $1/\lambda$  (b)  $\lambda^2$
- (c) 2\(\lambda\) (d) 2/\(\lambda\)
- 35. A Uranium isotope  ${}^{232}_{92}$ U undergoes one  $\alpha$ -decay and one  ${}^{0}_{-1}\beta$ -decay. What is the final atomic number? (c) 89 (d) 91

  - (a) 90
- (b) 92

| S | Sr. | 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. | 31. | 32. | 33. | 34. | 35. |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| A | ns: | d   | b   | a   | d   | a   | a   | . с | d   | Ь   | c   | c   | d   | d   | a   | d   |

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- 36. Emission of radiation from radioactive substance is:
  - (a) Dependent on both temperature and (b) Independent of temperature but dependent
    - on pressure
  - (c) Independent for both temperature and (d) Independent of pressure but dependent on pressure
    - temperature
- 37. Which one of the following isotopes of lodine is used for the treatment of thyroid cancer?

**UNIT 13** 

pressure

- (a) I-113 (b) I-120
- (c) 1-131
- (d) I-140
- 38. A beta ( $\beta$ ) particle is a fast-moving electron. During a  $\beta$  decay how the atomic number and mass number of a nucleus change?

| Atomic Number    | Mass Number                                       |
|------------------|---------------------------------------------------|
| Remains the same | Increase by one                                   |
| Increase by one  | Decreases by two                                  |
| Increases by one | Remains the same                                  |
| Decreases by two | Decreases by four                                 |
|                  | Remains the same Increase by one Increases by one |

- 39. A naturally occurring radioactive element decays two alpha particles. Which one of the following represents status of daughter element with respect to mass number 'A' and charge number 'Z'?

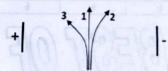
  - (a) 'Z' decreases by 4 and 'A' decrease by 2 (b) 'Z' decrease by 2 and 'A' decreases by 4
- (c) 'Z' decreases by 4 and 'A' decreases by 8 (d) 'Z' decreases by 8 and 'A' decreases by 4 40. A radioactive isotope 'W' decays to 'X' which decays to 'Y' and 'Y' decays to 'Z' as represented by the figure below:



What is the change in the atomic number from 'W' to 'Z'?

- . (a) Increased by 3

- (b) Increases by 5 (c) Decreases by 3 (d) Decreases by 5 41. Three paths of radioactive radiations are observed as shown in the figure in the presence of electric field. Which type of radiation in shown in path 1?



- (a) Alpha
- (b) Beta
- (c) Gamma
- (d) Cathode rays
- 42. What is the absorbed dose 'D' of a sample of 2 kg which is given an amount of 100 J of
  - (a) 200 Gy

(a) α-particle

- (b) 102 Gy
- (c) 50 Gy
- (d) 98 Gy
- 43. In the reaction,  $\begin{array}{c} 234\\92\\ \end{array}$  Th  $\rightarrow \begin{array}{c} 234\\91\\ \end{array}$  Y +  $\begin{array}{c} 0\\-1\\ \end{array}$  e the electron  $\begin{array}{c} 0\\-1\\ \end{array}$  e-emits from the:
- (b) 2nd orbit
- (c) Nucleus
- (d) Valence Shell 44. According to the equation  ${}^{A}_{\tau}X \rightarrow Y+3\alpha$  particles, what are the atomic and mass number of 'Y'?
- (a) Z-6, A-1245. Cobalt 60 is used in medicine and is an intense source of:
  - (b) Z-2, A-4
- (c) Z+1, A
- (d) Z + 3. A

| (a) α-particle | (b) β-particle |     |     | (c) γ-1                     | rays     | (d) Neutrons                           |     |     |
|----------------|----------------|-----|-----|-----------------------------|----------|----------------------------------------|-----|-----|
| Sr. 36. 37.    | 38.            | 39. | 40. | 41.                         | 42.      | 43.                                    |     | 15  |
| c c            | c              | C   |     | Principle of the last party | 10074-91 | 10000000000000000000000000000000000000 | 44. | 45. |
|                |                |     | C   | C                           | C        | C                                      | 9   |     |



- 46. Sodium 24 has half-life of 15 hour and it is used in medicine to estimate:
  - (a) Kidney Function (c) Iron in Plasma

- (b) Plasma Blood Volume
- (d) Thyroid Function

- 47. Wavelength of y-rays is:
  - (a) Equal to the X-rays

(b) Shorter to the X-rays (d) Boarder to the X-rays

- (c) Longer to the X-rays
- 48. Which of the following is unit of absorbed dose? (a) Sievert
  - (b) Gray
- (c) Roentgen
- 49. In a radioactive phenomenon observation shown in figure where a deviates lesser than  $\beta$  in some electric or magnetic field (not shown in figure). What is the reason of less deviation of  $\alpha$ ?



(a)  $\alpha$  is charged particle

(b)  $\alpha$  is neutral particle

(c)  $\alpha$  is heavier particle

- (d) α is lighter particle
- 50. Which of the following effect is observed due to emission of  $\beta$ -during the phenomenon of radioactivity?
  - (a) A increase by 1 and Z remains same
- (b) Z increase by 1 and A remains same
- (c) Z decrease by 1 and A remains same
- (d) A decrease by 1 and Z remains same

| Sr   | 46. | 47. | 48. | 49. | 50. |
|------|-----|-----|-----|-----|-----|
| Ans: | b   | ь   | b   | С   | ь   |



